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THE IRON AGE.^{d.}

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THE IRON AGE

New York, Thursday, January 3, 1907.

The Kennedy Universal Plate Mill.

Designed by Julian Kennedy and built by the A. Garrison Foundry Company, Pittsburgh, a universal mill embodying a number of new devices has been installed by the Cambria Steel Company, Johnstown, Pa. Mr. Kennedy's improvements, which are patented, provide particularly for the support, adjustment and driving of the vertical rolls and their ready removal, and also cover a new cruciform pinion housing arrangement built up of horizontally divided parts. In Fig. 1 is a view of the mill complete with pinion housings. Fig. 2 presents a plan view and a front elevation, while in Fig. 3 is an end

rolls and between the housings and is wider than the shaft. The connecting shaft is carried in end bushings in the squared shaft and is provided at each end with a pinion, *d*, intermeshing with a pinion, *c*, having a screw threaded hub engaging the adjusting screw *f* for the lower part of the vertical roll housing. The pinions *g* and *h* connect the pinion *c* to a similar upper pinion, *i*, engaging the adjusting screw *k* for the upper part of the vertical roll. A movable pull back cylinder, *l*, movable between an outer casing and an inner stationary sleeve, which surrounds the rod *m*, holds the vertical housing against its adjusting screws. The inner end of the rod has the enlargement *n*, which enters a recess in the housing *a*. The latter is enlarged vertically, so that when

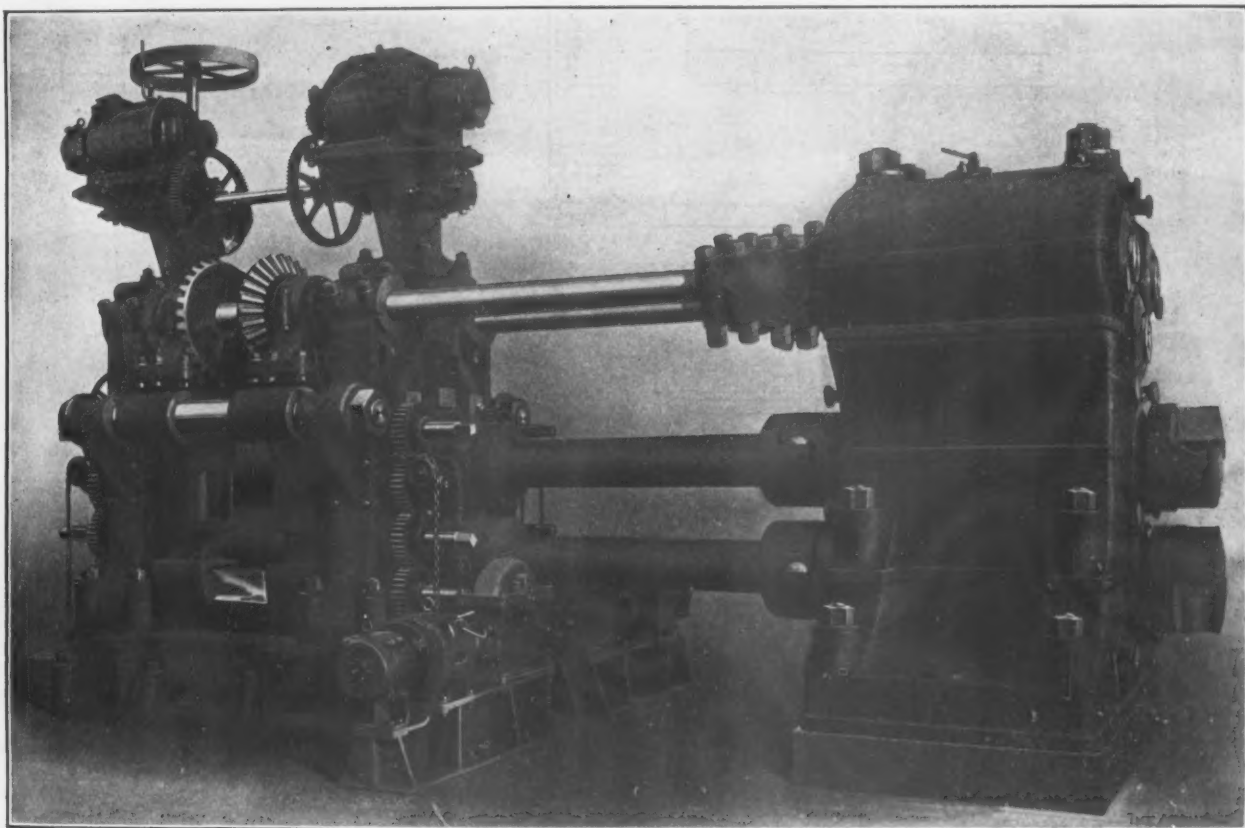


Fig. 1.—The Kennedy Universal Plate Mill.

elevation. In Fig. 4 is a partial sectional front elevation showing the support and connections of the hangers for the vertical rolls. Fig. 5 shows the guide and roller system employed when the vertical rolls are removed, leaving a two-high mill.

As shown in Fig. 4, each of the vertical rolls is carried in a removable housing, *a*, which is semicylindrical in the body portion, while its upper and lower parts contain the vertical bearings for the upper and lower shafts, respectively, of the two rolls. The upper parts are provided with lateral portions *b*, through which extends an upper supporting shaft for both vertical rolls. This shaft rests in bearings which project out from the main housings, as shown in Fig. 1. The housings *a* are forked at their lower ends to fit over a squared shaft which is bored out longitudinally to receive a connecting shaft, *c*, for the roll adjusting mechanism. To protect the squared shaft from falling scale recesses are formed in the lower parts of the housings which receive the ends of a curved cover plate. The cover extends parallel with the horizontal

the housing is lifted slightly the rod *m* may be pulled out and the housing lifted free. The upper part of the vertical roll housing has a bore of diameter sufficient to allow the roll to be pulled up through it when the upper bearing blocks are removed.

In the usual way the bevel wheel on the upper journal of each vertical roll intermeshes with a bevel wheel splined to the horizontal shaft driving the vertical roll, as shown in Fig. 1. The bevel wheel on the driving shaft has an elongated hub with a projecting annular ring fitting in a closed case. The arrangement of brasses in the closed case is special and the bolts holding the upper and lower parts of the case together are made of sufficient strength to carry the weight of the vertical roll and its housing. A simple provision is made for taking up wear from the end thrust of the driving shaft.

The cruciform shape of the pinion housing is a feature to which the designer attaches importance as giving symmetry and strength. The pinions to which the driving shafts of the vertical rolls are connected intermesh with

an idler which intermeshes with the driving pinion for the upper horizontal roll.

When the mill is converted into a two-high blooming mill by the removal of the vertical rolls and housings there is dropped over the squared shaft *c'*, Fig. 5, the lower bracket portion of the support for the guide *r*. The guide has projecting ribs, *s*, to guide the entering metal, and for

through which oil is supplied to the necks within the collars.

The removal of the vertical rolls is easily accomplished by disconnecting and lifting the driving shaft by an overhead crane. The shaft will lift the vertical roll housings and with them the rolls and their attachments.

The main rolls of the mill, shown in Fig. 1, are 24 in.

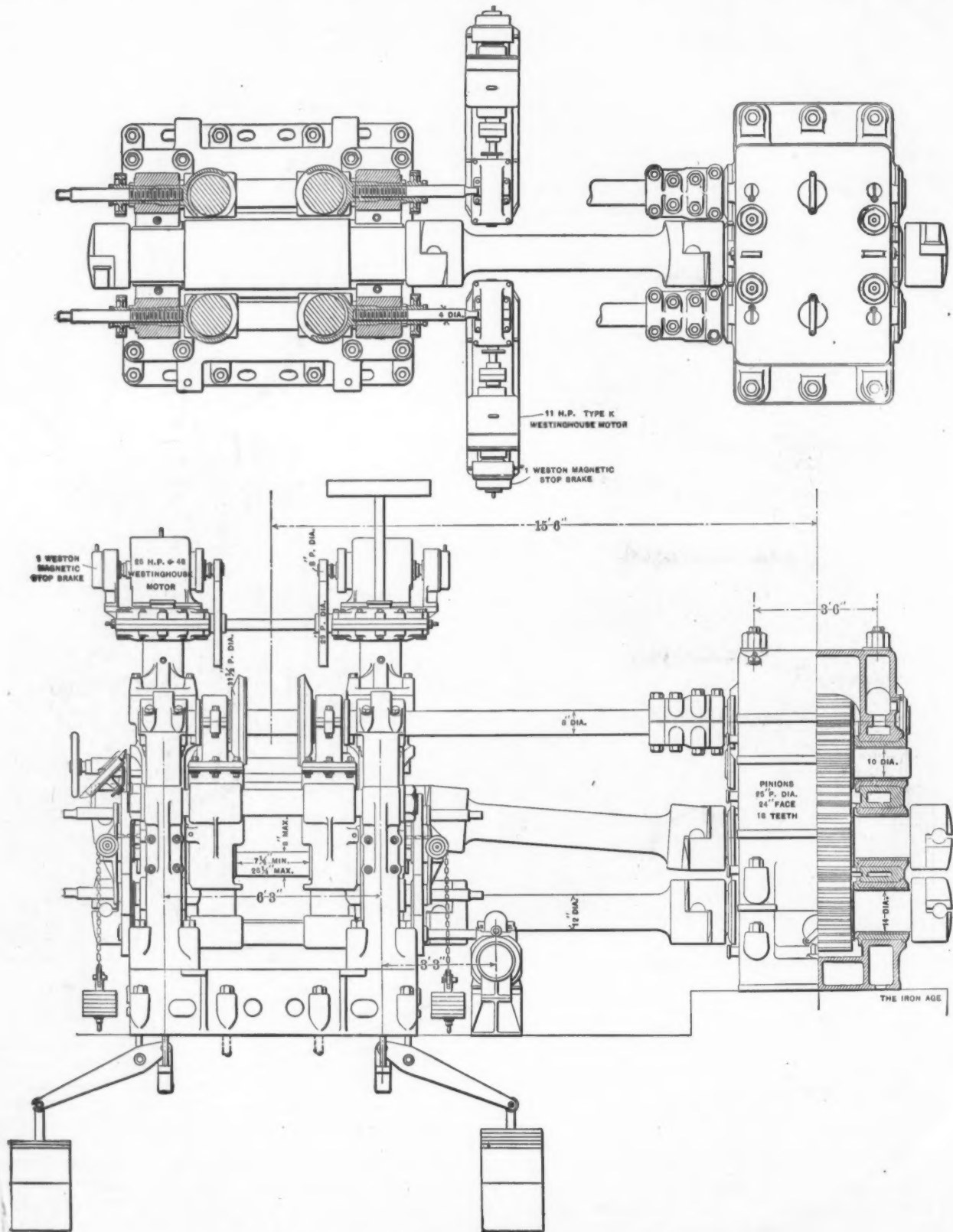


Fig. 2.—Plan and Elevation of Kennedy Universal Mill and Pinion Housing.

the first pass, where the ingot is too short to be forced in by the roller table, a roller, *t*, is provided to support and feed the metal. Collars *u* surround the necks of this roller and extend into the cavities *v*, into which water is fed through the pipe *w* and taken off by the pipe *x*. The intermediate partition *y* secures the circulation of the water through the chamber. There are also oil pipes, *z*,

in diameter and the necks are 18 in. in diameter. The vertical rolls are 13 3/4 in. in diameter and their necks 5 in. Plates from 8 to 28 in. wide and 150 ft. long can be rolled with the usual range in thickness. With the exception of the bedplate and pinion housings practically the entire mill is of steel castings and forgings, and all pinions and gears are cut. In addition to the easy removal of the

vertical rolls a special point has been made of securing close fitting couplings, absence of backlash and great strength of gearing.

The Foundry Supply Association.

The preparations for the convention of the American Foundrymen's Association, to be held in Philadelphia May 20 to 24, are progressing satisfactorily, and the exhibit of foundry supplies and equipment to be held in connection therewith by the Foundry Supply Association is now an assured success. A floor plan of the Armory, in which the exhibit is to be housed, has been prepared for distribution. The Armory is a building 165 x 160 ft. on the inside, with a number of rooms adjacent, one of which will be used for the meetings of the American Foundrymen's Association. Adjoining the Armory at the side is a vacant lot, 100 x 200 ft., on which a temporary building will be

or for space in the exhibit, should be sent to Secretary H. M. Lane, Schofield Building, Cleveland, Ohio.

Fans for Automatic Stokers.—The Buffalo Forge Company, Buffalo, N. Y., has contracted to furnish two specially designed fans for furnishing forced draft for the automatic stokers of the American Stoker Company, which will be used at the new steam plant of the General

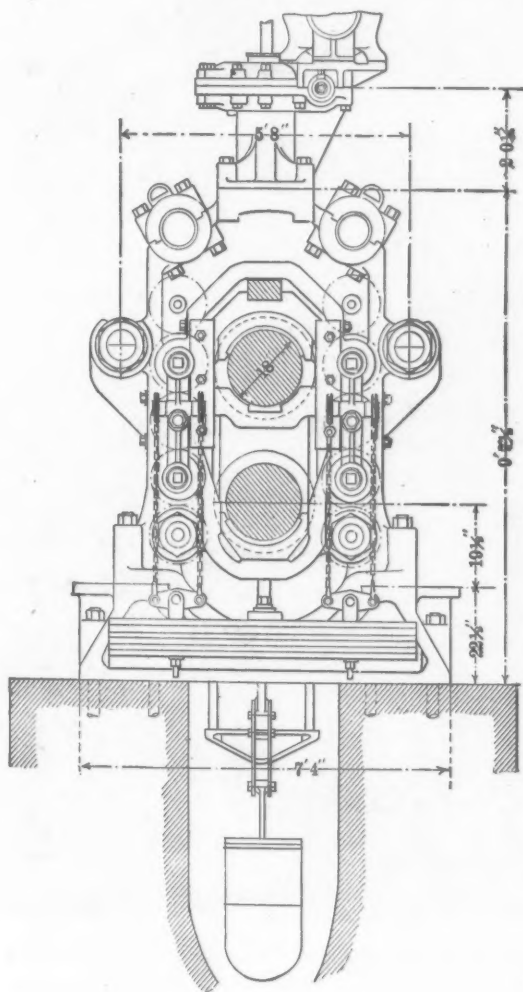


Fig. 3.—End View of Universal Mill.

erected for such exhibits as can not be placed in the Armory, comprising oil melting furnaces and machines which require special foundations. Arrangements have been made for supplying compressed air for those requiring it. The exhibits already arranged for cover practically the entire line of equipment for foundries.

This convention is expected to be by far the largest gathering of foundrymen which has ever been brought together, as it now appears certain that there will be over 1000 present from outside of Philadelphia. The programme, as thus far outlined, is better than that presented at any of the previous conventions. The fact that the Brass Foundrymen's Supply Association will be organized during the convention assures the attendance of a very large number of foundrymen interested in brass foundry practice, and one session will be devoted to the brass foundry interests. The foundry foremen will be represented as usual, and hold special sessions. Applications for membership in the Foundry Supply Association,

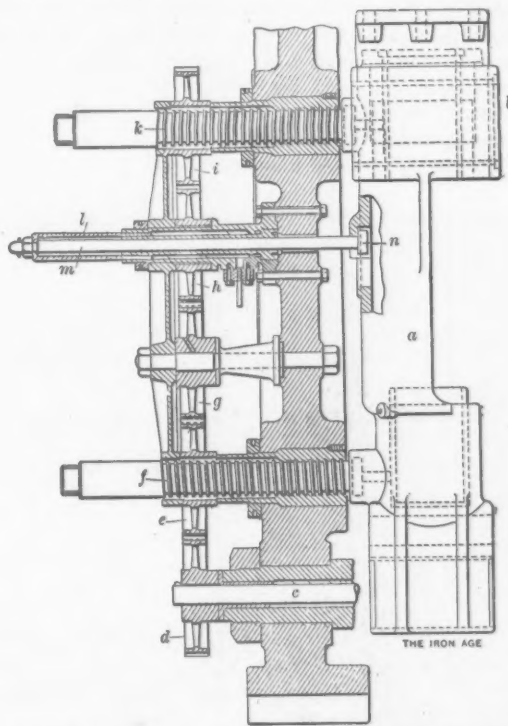


Fig. 4.—Sectional View Showing the Method of Support for Vertical Rolls.

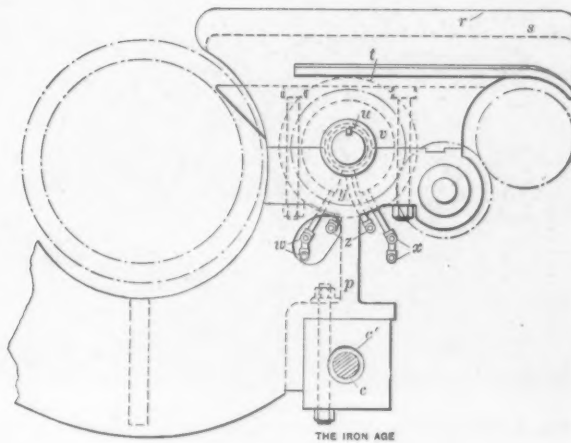


Fig. 5.—Guide and Roller System Used When Vertical Rolls Are Removed.

Electric Company, Schenectady, N. Y. The fans will be directly connected to high speed motors through Buffalo flexible couplings. The reasons for making the fans of special design were the desirability of using as high motor speed as possible; to make motor requirements as nearly standard as possible, and on account of the space requirements, the blowers each being called upon to handle 80,000 cu. ft. of air per minute at $2\frac{1}{2}$ oz. static pressure. In order to combine large capacity, high speed and comparatively low pressure, together with the demands for the best obtainable efficiency, careful proportions of inlet and outlet diameters and blade curvature radii are called for. The engineers of the company are now able to predetermine the proportions necessary for maximum efficiency. Recently a blower with wheel only $2\frac{1}{2}$ in. in width at periphery and 10 ft. in diameter was built to meet the requirements of high pressure, low speed and small capacity. The possibility of the success of such a design has been demonstrated.

Pawling & Harnischfeger Slag Cranes.

The modern scheme of converting blast furnace slag from the molten state into granulated form by quenching with water while hot has evolved a useful by-product from what was formerly considered a waste. This granulated slag is extensively used for ballasting railroad tracks, filling ground, making roads and in the manufacture of slag cement. To supersede the older method of transporting the slag in cinder ladles on cars to some convenient dumping ground, the electric traveling crane has been specially designed for the rapid and economical handling of the slag into railroad cars, by which it may be conveyed to any distance.

At Joseph Wharton's blast furnaces, Wharton, N. J.,

tures are to be found in the clam shell buckets and mechanism for operating them and handling the loads. The shells of each bucket are made in halves and are supported from cast steel brackets that are trunnioned on the same shaft on which the bucket cable drum revolves.

The trolleys are 12 ft. 6 in. x 11 ft. 6 in. x 7 ft. high to the top of the housings. The trolley frames have cast iron sides with structural steel end girts extended at one end about 7 ft. to support the operator's cage. In the trolley slides the truck wheels are located and the bearings for the drum shafts and main pinions. To the hoist motor is coupled a slip friction coupling that connects through three sets of gears and pinions to the drum shafts. In this train of gearing is incorporated the mechanical load brake. To the hoisting drum, which runs free on its shaft is fitted a very substantial friction clutch.

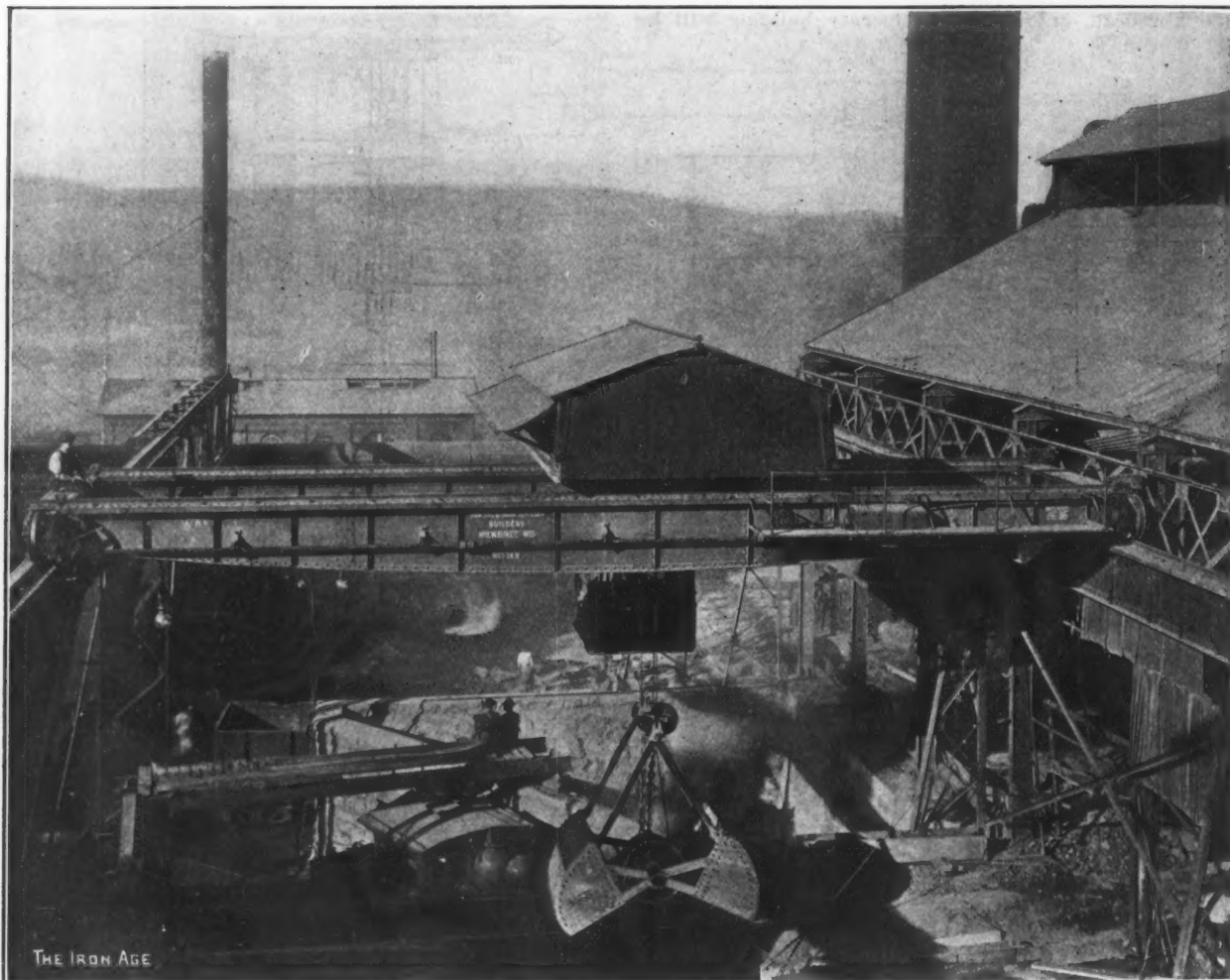


Fig. 1.—One of the Electric Traveling Slag Handling Cranes Installed at Joseph Wharton's Blast Furnaces by Pawling & Harnischfeger.

there have recently been placed in service two electric traveling slag cranes built by Pawling & Harnischfeger, Milwaukee, Wis., each handling a clam shell bucket of 3 cu. yd. capacity. These cranes are in general identical, except as to dimensions. One of them, shown in Fig. 1, has a span of 49 ft. 10 in., and has a lift of 27 ft. 6 in., and serves the No. 2 furnace; the other is of 34 ft. span and 46 ft. 9 in. lift, and serves the No. 3 furnace. Fig. 2 is a top view of the latter crane and shows the trolley and mechanism with the housing removed. The drum with the grooving in the center is termed the hoisting drum, the dumping drum being grooved at the ends. In this view can be seen the parts which connect to levers in the cage for operating the friction clutch and band brake controlling the drums. The line drawing, Fig. 3, illustrates an end view of the trolley, from the main drum gearing end, with the cage and bucket attached.

The bridge and trolley operating parts are the same as are usually employed in regular crane practice, three motors being used, one for hoisting, one for traveling the trolley and one for the bridge. The distinguishing fea-

The friction rim is bolted to the drum flange, the clutch center being keyed to the shaft. Wood blocks fastened to the clutch ring are expanded to grip on the clutch rim by a wedge action applied through a system of levers and bell crank to the clutch lever in the cage. The dumping drum also runs free on its shaft, but is made to revolve with it by a permanent friction coupling fitted in the end of the drum. At the same end and on the outside is the band brake, which is also operated from the cage by a foot lever.

These cranes are operated continuously day and night and under very trying conditions. In running off a heat the molten iron is conveyed through troughs to large ladles for pouring, the slag being skimmed off and run to large reservoirs where, as it leaves the troughs, it is converted into granulated form by coming in contact with steam or water emerging from a large pipe immediately under the trough. This creates a mass of vapor that carries with it quantities of sulphurous gas and minute particles of slag. Despite the fact that the cranes are enveloped in this cloud of vapor which obstructs the view

of the bucket and slag pit, the operation is conducted with remarkable precision and speed. This is made possible through the medium of indicators in the operator's

motors, one clutch lever and one foot brake. To open the bucket the hoisting drum clutch is released while the foot brake is applied to the dumping drum. The bucket jaws

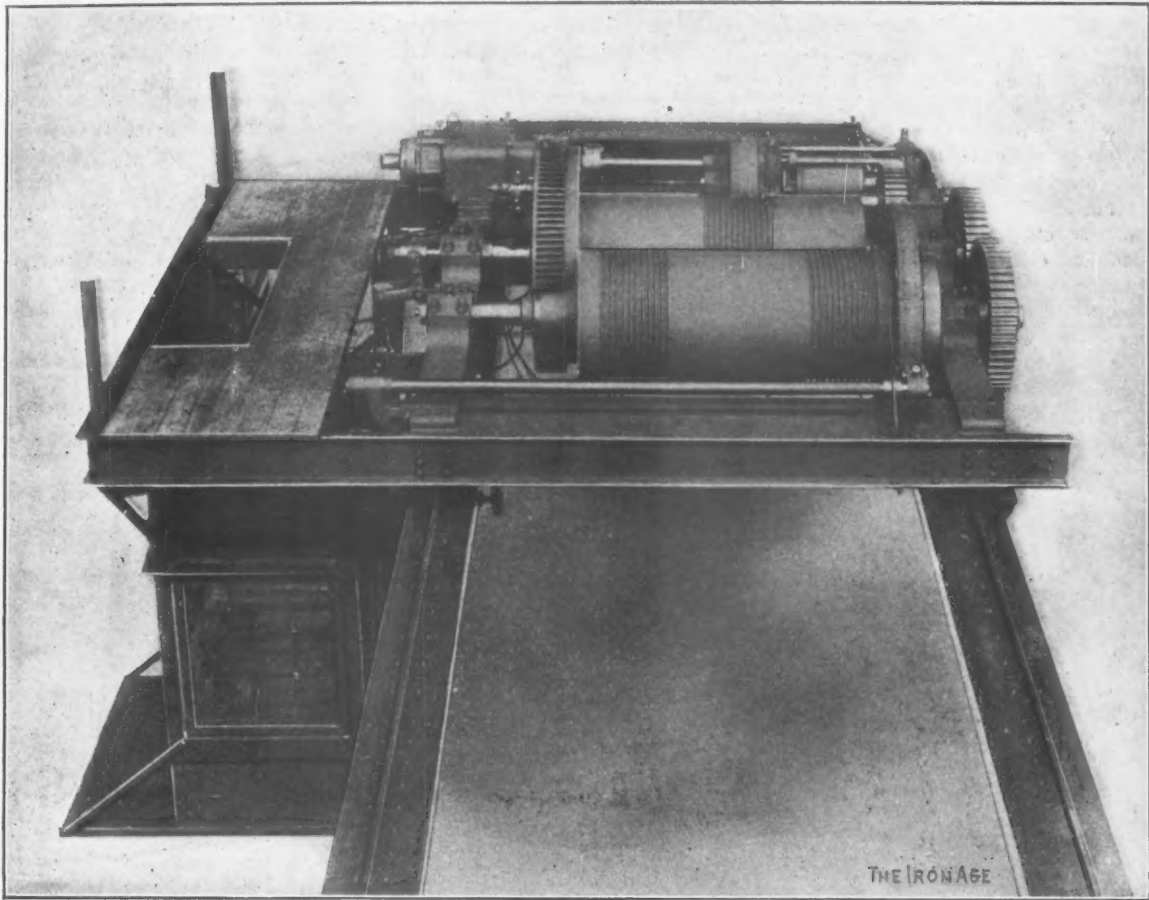


Fig. 2.—A View of the Trolley with Housing Removed.

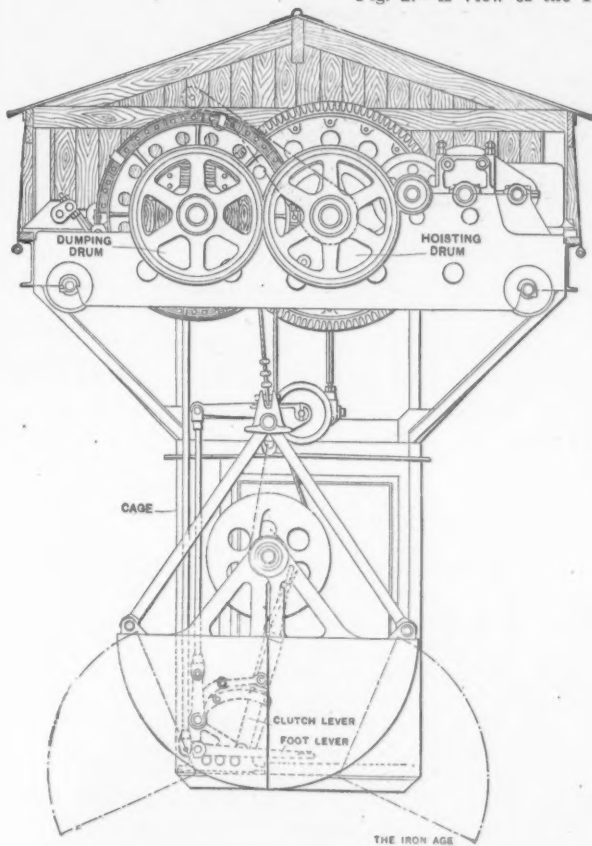


Fig. 3.—End Elevation, Showing Trolley, Cage and Bucket.

cage, which at all times show the exact location of the bucket and crane in relation to the slag pit and cars.

The operation is very simple, being governed by three controllers, one each for the hoist, bridge and trolley

being trunnioned at the center and being held at the corners, their weight forces them to open, the operator checking the hoisting drum when the bucket has opened. To lower the bucket the foot brake is released from the dumping drum, the weight of the bucket carrying it down into the slag. By again applying the hoisting drum clutch and starting the hoist motor the bucket closes over and hoists the load of slag cinder and is raised to the required height as indicated by the gauges. The load is carried and located over the cars, the foot brake applied, the hoisting drum clutch released and the load is dumped.

Gas engines have been very successfully experimented with by the Boston Elevated Railway Company in the driving of dynamos. According to the *Street Railway Journal*, one of the stations having a capacity of 700 kw. has been in continuous operation long enough to afford interesting figures. For four months, and working under severe conditions, a kilowatt-hour on an engine load factor of 74 per cent. has been obtained with 1.45 lb. coal. A test of 30 days' duration, when the plant was running 16 hr. a day and using Pocahontas coal, gave a somewhat lower average—1.31 lb. per kilowatt-hour. Taking into account all considerations, the fuel economy of the plant corresponds to that of a steam plant giving a kilowatt-hour on about 12 lb. of steam.

When the plans of the trustees of the Chicago drainage canal for its extension a distance of two miles are carried out, at an expenditure of \$2,000,000, it is stated that lake vessels will be able to unload their cargoes at Joliet. The plans include the establishment of a 40,000-hp. plant, using water from the lake, and the construction of an inland harbor for boats coming from the ship canal. The latter will have a depth of 26 ft. and an average width of 200 ft. The building up of industries along the 40-mile stretch of ship canal is confidently predicted.

A Newton Heavy Slab Milling Machine.

In the building of large machinery, especially locomotives, on which there is a great deal of forge and other steel work, such as connecting rods, &c., it is now considered most economical to forge a piece rough and machine off the surplus metal. The increased demand for output which this imposes on the machine tools required has been met by the Newton Machine Tool Works, Philadelphia, in the redesigning of all its heavy slab milling machines. The illustrations show an extra heavy slab milling machine which is particularly adapted to railroad and locomotive machine shop use, but is also suitable for any heavy slab milling where low production cost is desired. Figs. 1 and 2 are views of the driving and operating sides respectively, and Fig. 3 an inside view of the gear box for the table travel.

The spindle of the machine, which is $6\frac{1}{2}$ in. in diameter, and has a main bearing 15 in. long, is driven through worm, bevel and spur gearing by a 35-hp. 2 to 1 variable

The cross rail has a bearing on the main or wide upright of 25 x 38 in., and on the outboard or narrow upright of 12 x 31 in. The cross rail is 16 in. wide on its face, and the center of the spindle is carried 4 in. below the lower edge of the rail, so as to work around forged oil cups on locomotive connecting-rods and to be able to sink in and mill keyways on large diameter shafts having a wide variation in diameters, and other similar work. The cross rail is counterweighted and has hand adjustment with power quick movement in both directions. The latter is so designed as to be available for sinking the cutter to the required depth by power. This is the general practice followed on this machine, which is believed to be the only one capable of so doing, as the cross rail screws are arranged to pull the cross rail down to the work instead of pushing it down, as in other designs. In addition to being advantageous in operation, and a big time saver, this overcomes the chief difficulty previously experienced in fluting locomotive connecting-rods, where it is necessary to sink the cutter $1\frac{1}{4}$ to $1\frac{3}{4}$ in. in the rod. It overcomes the tendency of the cross-

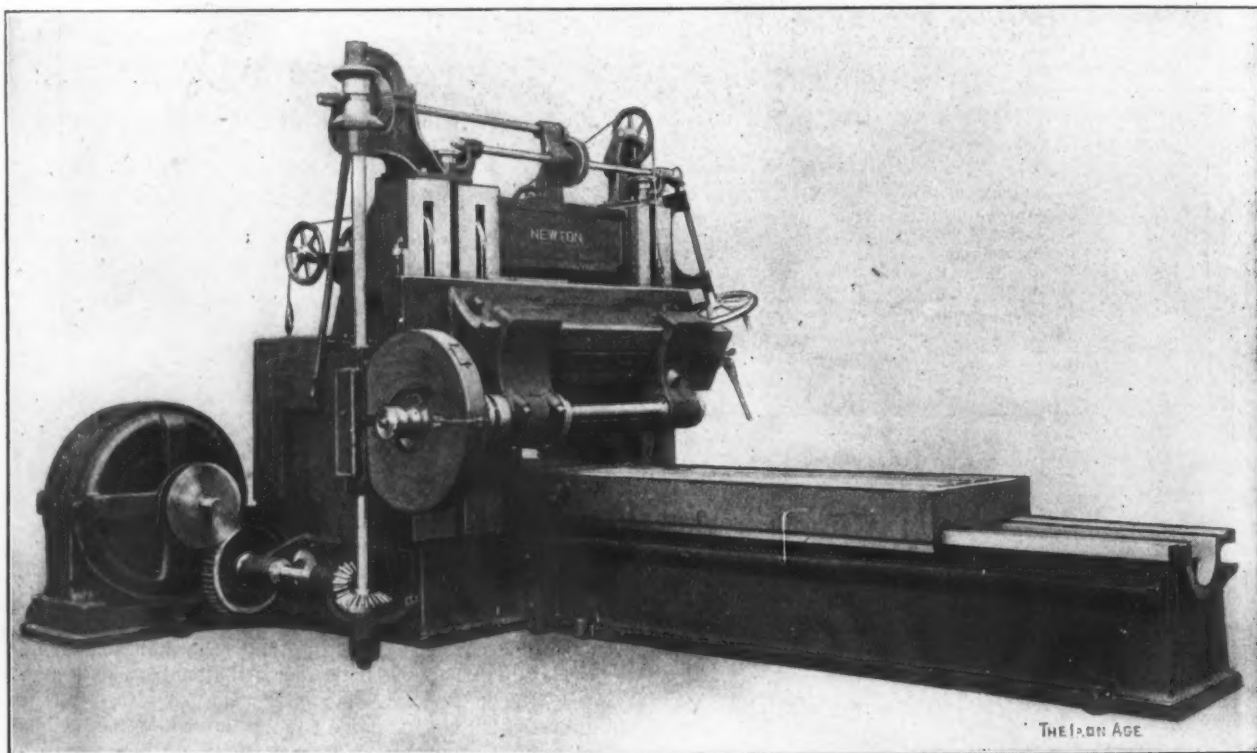


Fig. 1.—The New Extra Heavy Slab Milling Machine Built by the Newton Machine Tool Works, Philadelphia, Pa.

speed motor. The driving worm is of case hardened steel with a steep lead and has a roller thrust bearing; the worm wheel is phosphor bronze, the ratio between the two being 20 to 1. With the exception of these, all other gears on the machine are of steel. The spindle is reduced to 6 in. in diameter in the bore of the driving worm wheel, to which it is connected by a double spline. The spindle has 8 in. endwise adjustment, for convenience in setting cutters. After the work has been placed in the machine the arbor is arranged to drive by a butterfly key, which is inserted in a slot across the face of the spindle and a hole in the arbor. The outboard bearing for the arbor is bushed, the bushing being tapered on the outside and split, so as to compensate for wear, as it is arranged to fit over the arbor bushings and be adjusted to support the arbor close up to the work being milled.

The cross rail is of the inclined face design, which in addition to carrying the spindle close to the uprights overcomes to a very large extent the tendency of the cutter to "pull in," when milling on a piece which has narrow surfaces succeeding wider ones. This angular rail bears about the same relation to the straight type of cross rail that the spring or goose neck tool does to the straight tool in the planer, as it prevents gouging. It also reduces the possibility of chatter on light work.

rail to rise and in connection with a provision to prevent the table from pulling forward when sinking in or working back, due to the pulling of the cutter, obviates the breaking of cutters and arbors and the consequent damage resulting from the cross rail pushing upward. The uprights are of extra heavy sections, and are 36 in. deep.

The carriage is 36 in. wide and 7 in. deep and long enough to mill 14 ft., and has a bearing on the bed which is $29\frac{1}{2}$ in. wide over all. It is operated through a steel rack 4 in. wide by a bronze spiral pinion and is fitted with a gear box of a special design, as shown in Fig. 3, for which a patent is pending. The gears in this box are all of steel, and run in oil. To distinguish the driving shaft a pulley has been placed upon it, although in actual use a worm wheel is used. On this driving shaft there are three gears on one sleeve, which slide and mesh into the three idle gears in the center. These three idle gears mesh into three gears on the driven shaft, which also slide. The contact edges of the teeth are beveled, so that the gears can readily be shifted while running. This is an exceedingly compact box, easy to control, and affords exceptional rigidity. The carriage feeds range from 1 to 10 in. per minute, and a quick power motion is possible in both directions. The construction adopted makes not only the drive, but the feed motion as well, absolutely pos-

itive with relation to the cutter, no belts being used. The controlling lever, for raising the cross rail, is arranged so that when raised the cross rail goes up and when depressed the cross rail is lowered. A forward movement of the controlling lever for the carriage gives it a quick motion forward and a backward movement the reverse.

The machine has been in operation on slab milling for something over six months, giving the following performance: Width of cut $9\frac{1}{2}$ in., depth of cut 9-16 in., and lineal feed of table per minute 8 in. This equals a removal of metal of 43 cu. in. per minute, corresponding to about $1\frac{1}{2}$ cu. in. per minute per rated horsepower of the motor, which is claimed to greatly exceed all previous milling records, these having been obtained on spur gear driven machines. It serves to indicate that the best results in milling are obtained by the worm and worm wheel drive, provided it is correctly designed and proportioned. It might be of interest to add that the Newton Machine Tool Works are largely responsible for the use of worm and worm wheel for machine tool practice, as they were the first to develop this class of gearing for this work, bringing it to a successful commercial point.

On one typical piece of work the machine was used for

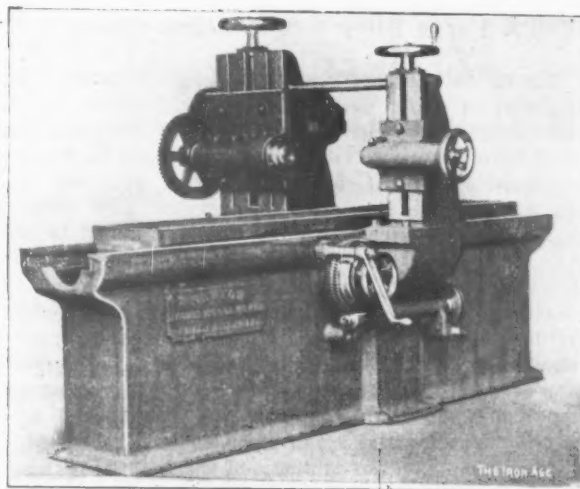


Fig. 4.—The First Newton Slab Milling Machine, Built in 1884.

to record the fastest commercial milling work ever done. A great deal of the success of the operation is due to the

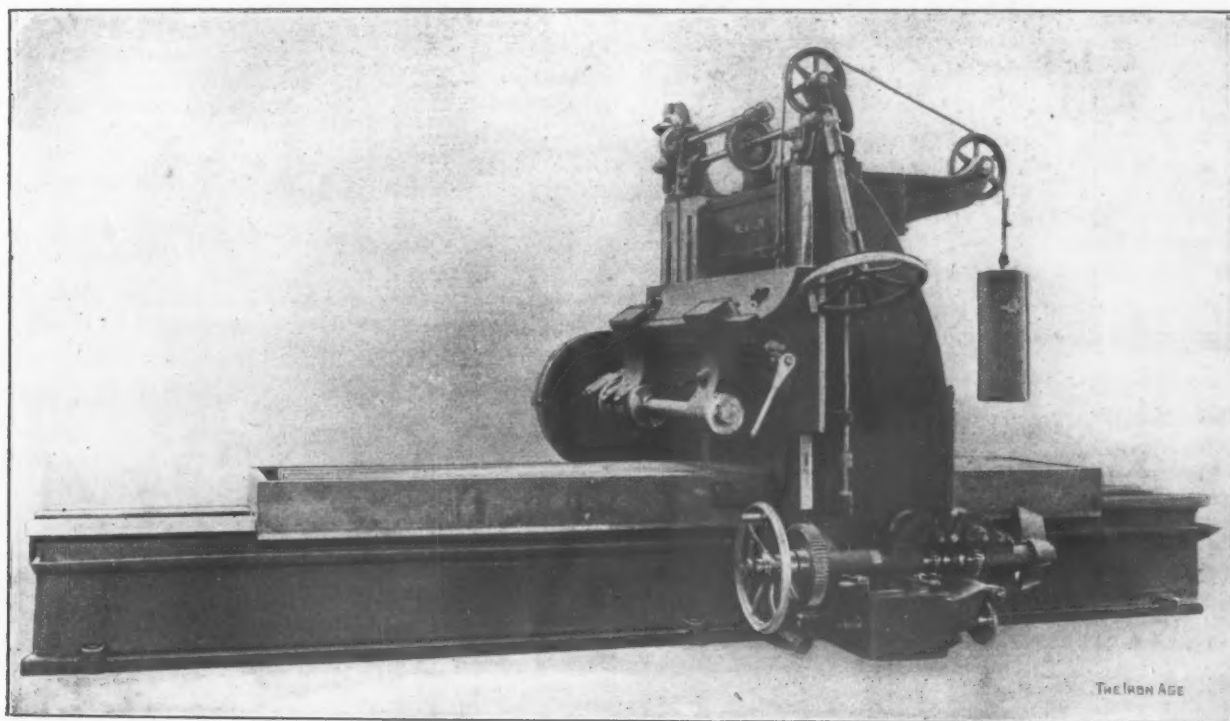


Fig. 2.—View of the Operating Side of the Newton Heavy Slab Milling Machine.

fluting or channeling two locomotive connecting rods, the cut on each being 3 in. wide and $1\frac{1}{2}$ in. deep, and the

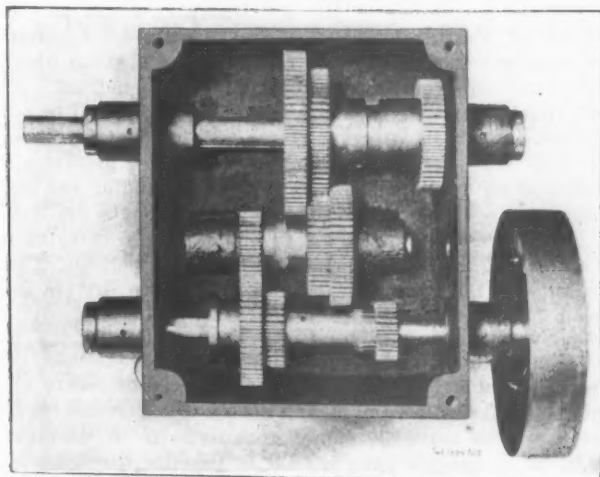


Fig. 3.—An Interior View of the Change Gear Box for the Table Travel.

milling accomplished at a lineal advance or feed of $3\frac{3}{4}$ in. per minute. The figures given above have been maintained on this work for some time past and are believed

design of the cutter, which is of the inserted tooth type, the teeth being of air hardened steel, inserted on a true spiral. The cutter runs at 86 ft. peripheral speed.

As a comparison of the advance made in milling machine practice Fig. 4 herewith shows the machine built by this company in 1884, which was designed for the same class of work that is now being done on the new milling machines, including the rods as referred to above, and in its day it was considered a record breaker. This is said to have been the first commercially successful slab milling machine ever built. It is well to call attention to the construction of the table, which is of the inside square lock design, instead of the overlapping square lock design as shown on the new design. The feed was by spur pinion and rack, quick table motion being obtained by the crank shown on the side, one turn of which advanced the carriage 7 in. The drive was through compound spur gears, and the outboard bearing had to be adjusted independently of the main spindle bearing.

A steel floating target was recently launched at the Brooklyn Navy Yard, to be used at the Sandy Hook proving grounds. It is made to represent a section of a battleship and is composed of 5-in. and 6-in. plates, its weight being 70 tons.

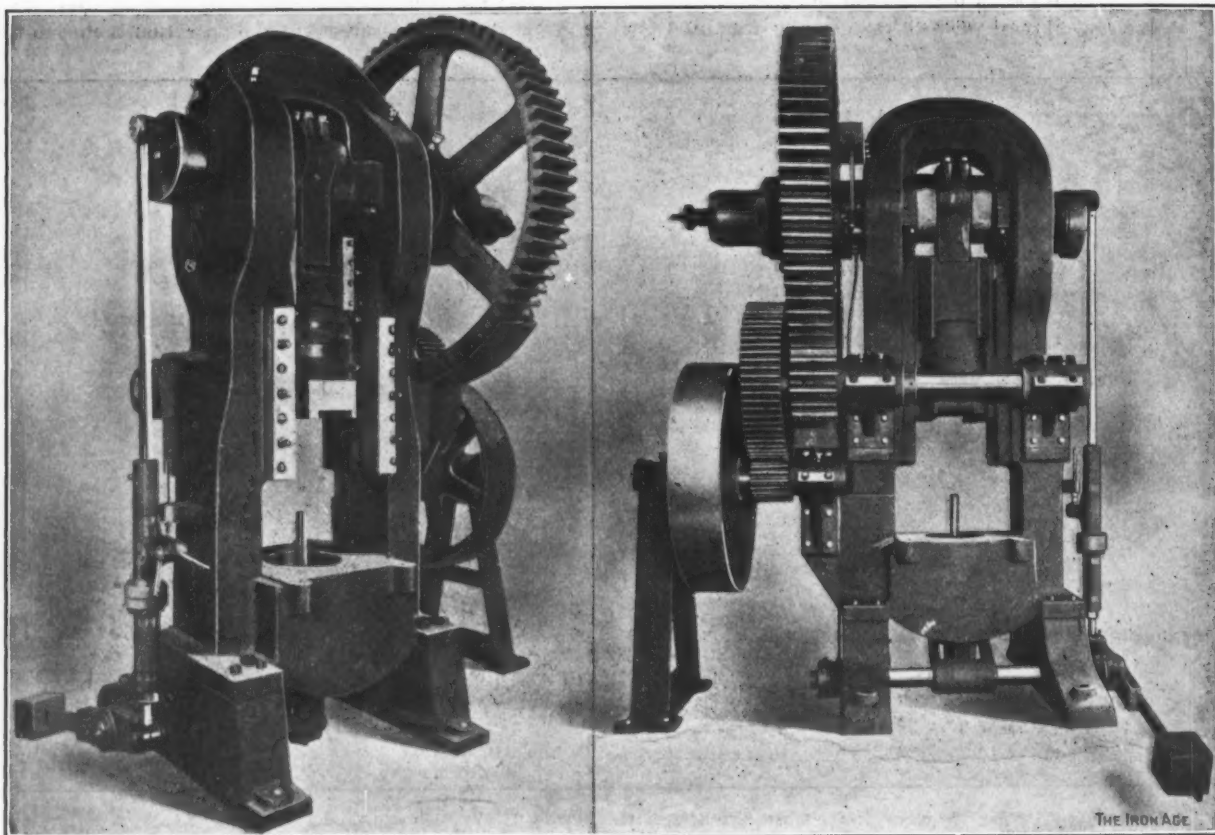
A Large Bliss Single Crank Press.

The increasing variety of articles that are being manufactured in power presses has brought about the development of many presses which, but a few years ago, would have been considered almost impossible to produce, so massive are all of the parts entering into their construction. Large double crank presses and drawing presses are now becoming quite common, but it is rare to find a single crank press of the size illustrated, particularly one combining simplicity of design, ease of manipulation and accurate guiding of the slide in exceptionally long adjustable guides, all of which are features claimed for this machine. It is the largest single crank press ever built by its builder, the E. W. Bliss Company, Brooklyn, N. Y. An idea of its size may be had from the following dimensions and weights:

The frame is a solid casting and weighs over 18,500 lb. The area of the bed is 31 x 32 in. The distance from the bed to the slide at its upper limit of stroke and when

on the bracket on the left hand upright in the front view. This knockout can also be adjusted by the crank disk, which is held to the shaft by a ratchet disk. The working of the press is controlled by a patent automatic jaw clutch, which is positive in its action and will not click when thrown out. Depressing the foot treadle will cause the slide to make one complete stroke and then stop at its upper limit of movement.

Hydrolithe.—One of the great drawbacks to ballooning has been the cost and difficulty of manufacturing hydrogen gas. A recent consular report describes a new method for the manufacture of hydrate of calcium, perfected in France, which, because of the convenience attending the use of this product for the manufacture of hydrogen, is expected to exert an important influence upon the business. The new form of hydrate is called "hydrolithe," and, when pure, will generate 1.15 liters of gas per kilogram. It is safe and easy to handle, can be



Two Views of the Largest Single Crank Press Ever Built by the E. W. Bliss Company, Brooklyn, N. Y.

adjusted to its greatest height is 30 in. The crankshaft is 9 in. in diameter and gives a 12-in. stroke. The ratio of the gearing between the driving pulley and the crankshaft is 25 to 1, and the entire train of gears is made from steel castings with the teeth cut from the solid. The large gear is 80 in. in diameter by 10 in. face and weighs 4500 lb. The arrangement of the gearing is clearly shown in the rear view of the press, and as will be noted is very compact and so laid out that it will not interfere with an operator standing at the back of the press. The flywheel is 50 in. in diameter by 10 in. face and weighs 2500 lb. It makes 250 rev. per min. The total height of the press is 153 in. and the total weight is something over 41,000 lb.

Aside from the magnitude of this press, it is interesting in the details of its construction. The pitman is very heavy and is solid, with a scraped fit in the slide, the pressure strain being against solid metal. An adjustment of 3 in. is effected by an 8½-in. screw in the slide. This screw is made with a flat thread on the pressure side, which prevents all side strains. The knockout, which is clearly shown in both illustrations, is made to suit any height of die by adjusting the set screw shown

used for generation of the gas wherever water can be obtained, and for long flights can be carried for ballast instead of the usual sand, thus providing a medium which may be employed at will for refilling the balloon. As an illustration of the saving in weight which will be obtained by the substitution of the new method for those now in vogue it may be mentioned that the present apparatus for filling a 500 c. m. balloon, including the materials, fills three wagons, each of which weighs 3½ tons, and requires six horses. A two-horse wagon carrying a ton of hydrolithe is sufficient for the same balloon. This results in the saving of 18 horses and two drivers for each balloon.

Tantalum has characteristics which should make it very valuable for certain tools and purposes where extreme hardness, toughness and elasticity are prime requisites. It is being developed commercially in Germany and in its use for pens is said to promise the displacement of steel and gold. Tantalum pens resist the chemical action of inks to a remarkable degree and are much harder and more elastic than steel pens. They are more elastic than gold pens and of course do not have to be tipped with iridium, as do gold pens.

THE LACKAWANNA STEEL COMPANY.

Noteworthy Features of the More Recent Construction Work at South Buffalo, New York.

In *The Iron Age* of January 7, 1904, an extended description was given of the plant of the Lackawanna Steel Company at South Buffalo, N. Y., which then represented the results of more than four years of construction work on the largest individual steel plant in the world. The single finished product at that time was steel rails in standard sections. The mills and open hearth plant added in the next two years extended the operations of the company greatly, broadening the list of finished materials to include plates, structural shapes, light rails and bars. Perhaps no other piece of construction work in connection with the iron industry has attracted attention so widely, and various phases of the enterprise, from the first breaking of ground at South Buffalo, have probably been the subject of more comment in steel engineering circles than any other undertaking in the history of the industry. It is to be said, however, that in all essential elements the plans originally made, when it was decided to remove from Scranton to Buffalo, have been carried out, and the Scranton rail, on which the success of the company's Pennsylvania career was based, remains at the foundation of its operations, even while other lines have been entered upon with like success. To-day, with the fuller development of the plans for the Lake Erie situs, a capacity of 100,000 tons a month of various forms of rolled steel has been reached—a noteworthy achievement in view of all that has been met and overcome. While this is the tonnage aimed at in the beginning, it is believed entirely possible to increase this amount by 25,000 tons a month when the blast furnace now building is finished and direct metal is worked in both Bessemer and open hearth departments. The company's organization has now had time to become seasoned, and has reached the point at which new construction, from being paramount or at least equal in importance to manufacturing, has become secondary and goes on without interrupting the machinery of production. Under such conditions it is timely to refer to some portions of the plant which have been completed since the appearance of the article published three years ago and to the lines on which the present administration has developed its plans.

More Recent Developments.

Something may be said first about raw materials. The iron ore properties controlled or owned in part by the Lackawanna Steel Company were referred to in our article of January 7, 1904. In the interval the Sunday Lake mine on the Gogebic range, Lake Superior, has been acquired entire, and all but 350 of the 2000 shares of the Brotherton Iron Company, owning the Brotherton mine on the same range. The Lake Superior mining operations of the Lackawanna Company are in the hands of Pickands, Mather & Co., Cleveland, Ohio, with the exception of the Negaunee mine, operated by the Cleveland-Cliffs Iron Company, which has an equal interest with the Lackawanna Steel Company in that property.

Some changes have been made in the by-product coke oven plant at South Buffalo. Of the 940 ovens originally planned 470 were built. It is expected that all these will be in operation early this year. The stamping of coal has been discontinued, and top charging has been substituted for the slide charging, for which machines were employed. A coal crusher has also been installed. The changes are similar to those made in the Lebanon, Pa., by-product plant of the company, where, owing to the differing volatile content of the coals, the caking and slide charging of the coal was discontinued. The Indiana County, Pa., coals of the company may be used in the by-product ovens if recent experiments in washing should result sufficiently favorably. Meantime, as announced in these columns last week, the company has acquired the well known J. W. Ellsworth coal properties in Washington County, Pa. The extension of the by-product system at South Buffalo will be contingent on

future experience. It has been demonstrated there as in by-product coking operations generally in the United States, that ovens must be adapted to the coals to be used, and that uniformity in coal is a prime essential to success.

Blast Furnace Gas Engines.

Naturally the gas engine practice at South Buffalo has been a matter of interest, since the Lackawanna Company pioneered in this country in the use of blast furnace gases in blowing engines and in engines generating electric power. That the complete gas engine installation is and has been in constant use is perhaps the best answer to the questions that have been asked as to the results of the departure. To pioneer in such an important field and one in which the testimony concerning European practice is conflicting was no small undertaking. The fact that American furnace practice and the ores depended on in this country differ from the practice and the ores abroad, together with the flue dust problem with which all furnaces using lake ores have to deal, beset the way of the Buffalo company with special difficulties. The washing of the gas has been the subject of most painstaking study in the light of special investigations in Europe conducted by the company's engineering staff. The satisfactory results attained in this direction were indicated in part in an article in *The Iron Age* of August 30. The development of the full efficiency of the 40,000 hp. of gas engines used at South Buffalo—32,000 hp. in blowing engines and 8000 hp. in engines connected to generators—has been, apart from the gas washing problem, very largely the schooling of power house forces and their acquisition of an experience which acquaintance with other forms of prime movers does not give. There have been minor changes in the design of the engines, beginning with alterations in the shape of the ports, to meet conditions which continental precedents do not cover. The fact that the company has contracted in the past year for Niagara power to supplement that of its own electric power house is due to new requirements for electric current, which otherwise could be met only by expensive additional equipment.

New Construction Since 1903.

In the article of January 7, 1904, a complete description was given of all the plant then in operation and of some for which plans were then being carried out. In the latter category were the slabbing, plate and structural mills and rail mill No. 2. The first block of six open hearth furnaces was referred to briefly, and mention was also made of the merchant mill. We have selected these last named portions of the plant for description and illustration in the present article. Before taking them up, however, reference should be made to the new blooming mill, which did not exist even in plan three years ago. It was erected to meet the needs of the merchant mill and in part of the structural mill, as well as to be in position at any time to ship semifinished steel to be marketed as such. The blooming mill building proper is 72 x 285 ft., with a lean-to 50 x 75 ft. over the engine. The auxiliary soaking pit building, which is really a continuation of the structure, is 72 x 285 ft. There are four four-hole soaking pit furnaces to which gas is supplied by four Fraser-Talbot producers, 12 ft. in diameter. The ingots are delivered by a Morgan chariot to a table 7 ft. 8 in. in length, driven by a 25-hp. motor. The piece passes then to the receiving table proper, driven by a 14 x 14 in. Crane reversing engine. The 40-in. blooming mill is driven by a 54 x 66 in. Tod reversing engine. The table to which the piece passes from the rolls is 63 ft. 3 in. long, and is driven by a Crane 14 x 14 in. reversing engine. At the end of this table is a 450-ton hydraulic shear built by Mackintosh, Hemphill & Co. For shearing into 4 x 4 in. billets a vertical

shear is provided, built by the United Engineering & Foundry Company. It is driven by a 75-hp. motor. The cranes in the blooming mill consist of a $7\frac{1}{2}$ -ton crane of 70 ft. span over the soaking pits, a 75-ton crane of 71 ft. span over the engine, and a 10-ton crane of 57 ft. span over the hydraulic shear. The hydraulic equipment of the blooming mill is served by a 16-in. by 8-ft. accumu-

lator. The mill was furnished by Mackintosh, Hemphill & Co., and the manipulator by the United Engineering & Foundry Company.

The OpenHearth Department.

The open hearth operations at South Buffalo have been of special interest in view of the innovations upon long accepted furnace design which appear in more

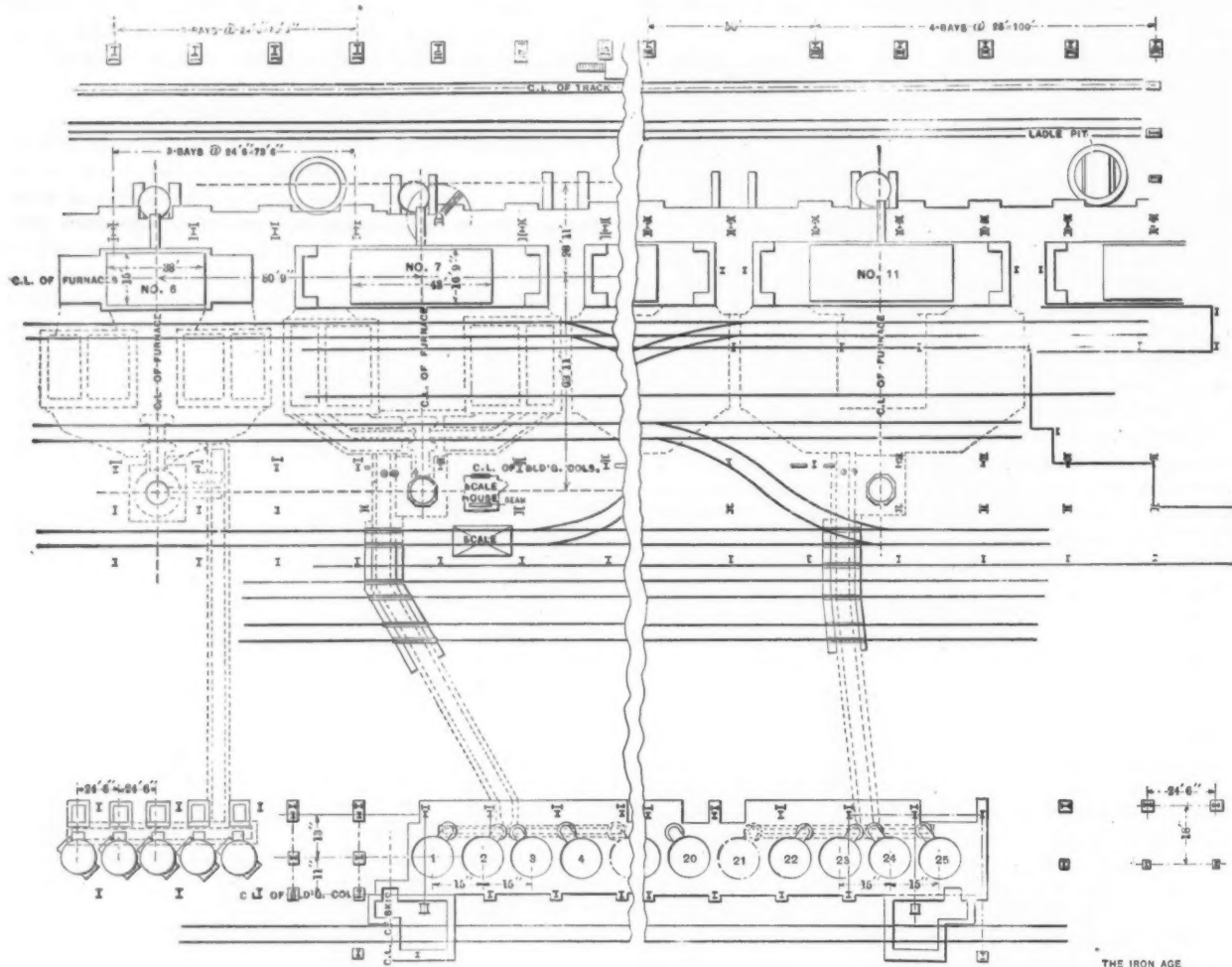


Fig. 1.—Plan of a Portion of the Open Hearth Furnaces and Producers of the Lackawanna Steel Company, Contrasting the Size of the New Furnaces, Nos. 7 to 11, with that of the Original Furnaces, Nos. 1 to 6.—No. 6 Has Been Increased to 38 Ft. in Length, While Nos. 1 to 5 Remain 30 Ft. Long.

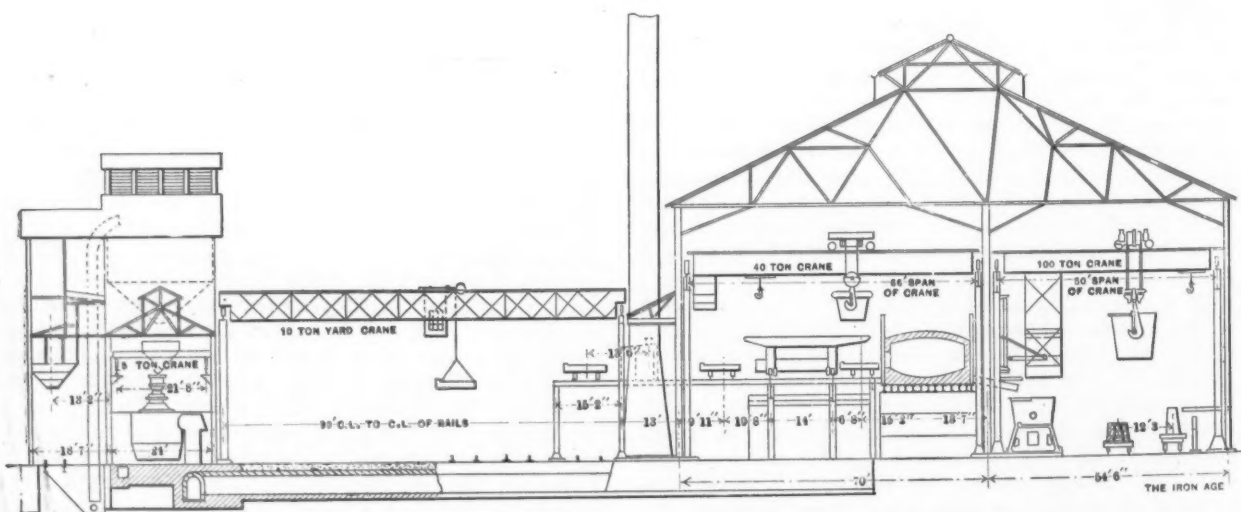


Fig. 2.—Section through the Open Hearth Building, Stock Yard and Producers.

lators. The mill was furnished by Mackintosh, Hemphill & Co., and the manipulator by the United Engineering & Foundry Company.

Contracts have been let to the Morgan Construction Company, Worcester, Mass., for a 10-stand continuous mill, with accessories, for rolling small billets and sheet bars. It will be similar to the sheet bar mill of the

recent additions to the open hearth department. The original plant consisted of six furnaces of 60 tons nominal capacity each. The five furnaces added in 1905 were built considerably larger and with changes in design calculated to give longer life, with increased output. To the character of these changes and the results attained reference is made in detail below. It may be

said that the practice at South Buffalo with these new furnaces and the auxiliary gas producers has been a matter of interest to open hearth engineers generally, and personal investigations have been made by a considerable number in the past year. In Fig. 1 is given a plan view of the new open hearth furnaces, Nos. 7 to 11. Fig. 2 is a cross section through the open-hearth building and producers.

A feature of the yard adjoining the open hearth building is a series of diagonal tracks, between two parallel tracks. Each diagonal track is long enough to accommodate ingot cars sufficient for a single heat, an arrangement which minimizes the delays due to shifting, where ordinary tracks are used. The through tracks on either side of the ingot-car yard allow access to either end of the diagonal tracks in case it is desired to change a part of the molds.

The stock yard separates the open hearth furnace building from the producer building. It is 963 ft. 7½ in. long, and the crane span is 90 ft. Some rearrangement of the stock yard tracks will be made which will give

The brick lined steel plate spout through which the steel is tapped is served by a hydraulic jib crane having a cylinder 5 in. in diameter, a lift of 6 ft. 6 in. and a swing of 12 ft. 6 in. The steel plate platform underneath the spout is so designed that the workman can serve the furnace with a minimum of discomfort from the heat or from a chance spill-over. Steel and slag are tapped into 65-ton ladles, the slag overflowing through a notch into the usual steel runner which delivers it into a cast steel box at the side of the ladle stand. The ladles are 9 ft. 8½ in. in diameter at the top, 8 ft. 2¼ in. in diameter at the bottom and 9 ft. 11 in. deep, being constructed of ¾-in. plate reinforced by bands.

The Furnaces.

The original open hearth plant consisted of six furnaces with hearths 30 ft. long and 15 ft. wide. The five new furnaces were built of revolutionary dimensions for stationary furnaces, being 43 ft. long and 16 ft. 9 in. wide. As against 450 sq. ft. of hearth area in the original furnaces Nos. 7 to 11 have 720 sq. ft. of hearth area,

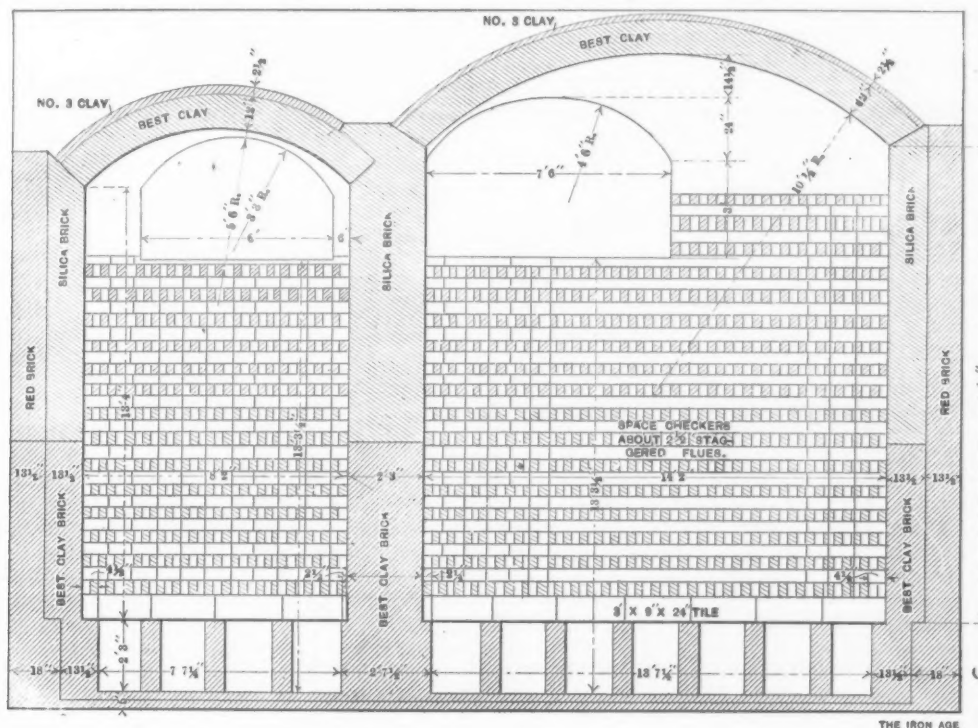


Fig. 3.—A Section through the Regenerators of One of the New Open Hearth Furnaces.

five standard gauge tracks for receiving scrap, pig iron, limestone and ore. The two outer tracks will then be used for the receipt of loaded cars, and the adjoining track on each side for the cars carrying the charging boxes, which will be filled from the loaded cars. The loaded boxes are lifted from various points in the stock yard and put on cars on an outside platform running the entire length of the furnace building, switches running at intervals from this outside track to the charging floor track. There are five stock yard cranes, each of 10 tons capacity.

The furnace building is of heavy construction 124 ft. 6 in. wide and 915 ft. 6 in. long, with a lean-to 13 ft. wide extending the entire length. The height of the building under roof trusses is 57 ft. The charging floor level is 18 ft. above the yard level. The charging floor is 70 ft. wide between columns, and the pouring floor 54 ft. 6 in. Two 40-ton electric traveling cranes command the charging floor and each is equipped with a 10-ton auxiliary hoist. There are two pouring platforms 8 ft. wide—one platform 290 ft. long for furnaces Nos. 1 to 6, and another 171 ft. 6 in. long for furnaces Nos. 7 to 11. The pouring floor is served by four 100-ton cranes with 50-ft. span and each has an auxiliary hoist of 25 tons capacity for tilting ladles and for general hoisting. Two pits of concrete construction, 13 ft. 6 in. in diameter and 8 ft. deep, are provided for the relining of ladles,

or 12 sq. ft. per ton of metal as against 7.5 feet. After the new furnaces were built No. 6 was remodeled and enlarged, 8 ft. being added to the length. The large regenerative area provided in the later furnaces is a feature worthy of notice. The brick flues leading from the producers to the gas regenerators are 4 ft. wide and 6 ft. high. In the newer furnaces the volume of the checkers is 4198 cu. ft. for the air regenerators, and 2417 cu. ft. for the gas regenerators, as against 2393 cu. ft. and 1953 cu. ft., respectively, in the original furnaces. Each furnace of Nos. 7 to 11 has two 36 x 40 in. gas uptakes, giving a total area of 2880 sq. in., as against one with an area of 1440 in. in furnaces Nos. 1 to 5, while No. 6 has two gas uptakes with a total area of 2376 sq. in. The two gas ports in furnaces Nos. 7 to 11 have each an area of 306 sq. in., while the single gas port in the earlier furnaces has an area of 804 sq. in.

The chief aims of the designers of the new furnace were to get a shallow bath and give a considerably larger area for the gases, instead of the deeper bath and the more contracted flame space of the ordinary type. Oxidation in the new furnaces is more rapid, and the greater length of the furnace, combined with the flattening of the port results in a greater degree of effective work of the gases upon the bath and a reduction of the destructive action of gases impinging upon the ends and roof of the furnace. The objection of overoxidation

that has been urged against the longer furnace and the shallower bath has not been borne out by experience. At the stage in the melting operation at which detrimental oxidation might be expected the reactions have gone far enough to give an amply protective covering of slag. The experience at Buffalo has been that both in output and life the larger furnaces have more than met the expectations of their designers. With the type of furnace represented by Nos. 1 to 5, it has been customary to get from 125 to 160 heats, or an average of about 140, before taking down the ends and repairing the downtakes. After an equal number of additional heats it becomes necessary to rebuild the furnace completely. The last furnace of the new group, No. 11, made 366 heats on its first run without any repairs, producing 23,118 gross tons of ingots, and 320 is the smallest number of heats made with any of the new type of furnaces before it became necessary to tear down the

cracked if the water was shut off for a few minutes, and burned out rapidly. They have been replaced with cast steel brick-lined doors, with the lower part of the door made detachable and held in place by two shrink links. No water is used with these doors, and they have worked well. Three Morgan charging machines serve the furnaces. Later it is expected that hot metal will be used.

The original group of furnaces was equipped with 33-in. gas and 42-in. air valves. At first these were water-cooled; but, owing to the difficulty of keeping a tight joint between the valve and stem, water cooling was omitted, the valves being made heavier and the stems solid. While this was an improvement, it was not satisfactory, as the valves could not be seated tightly and the furnaces were delayed by the replacing of broken valves. New air and gas valves were designed by the company's engineers. The air valves are 48-in. and 40-in. diameter for stack and regulating valves, respectively. The gas valves are 36 in. in

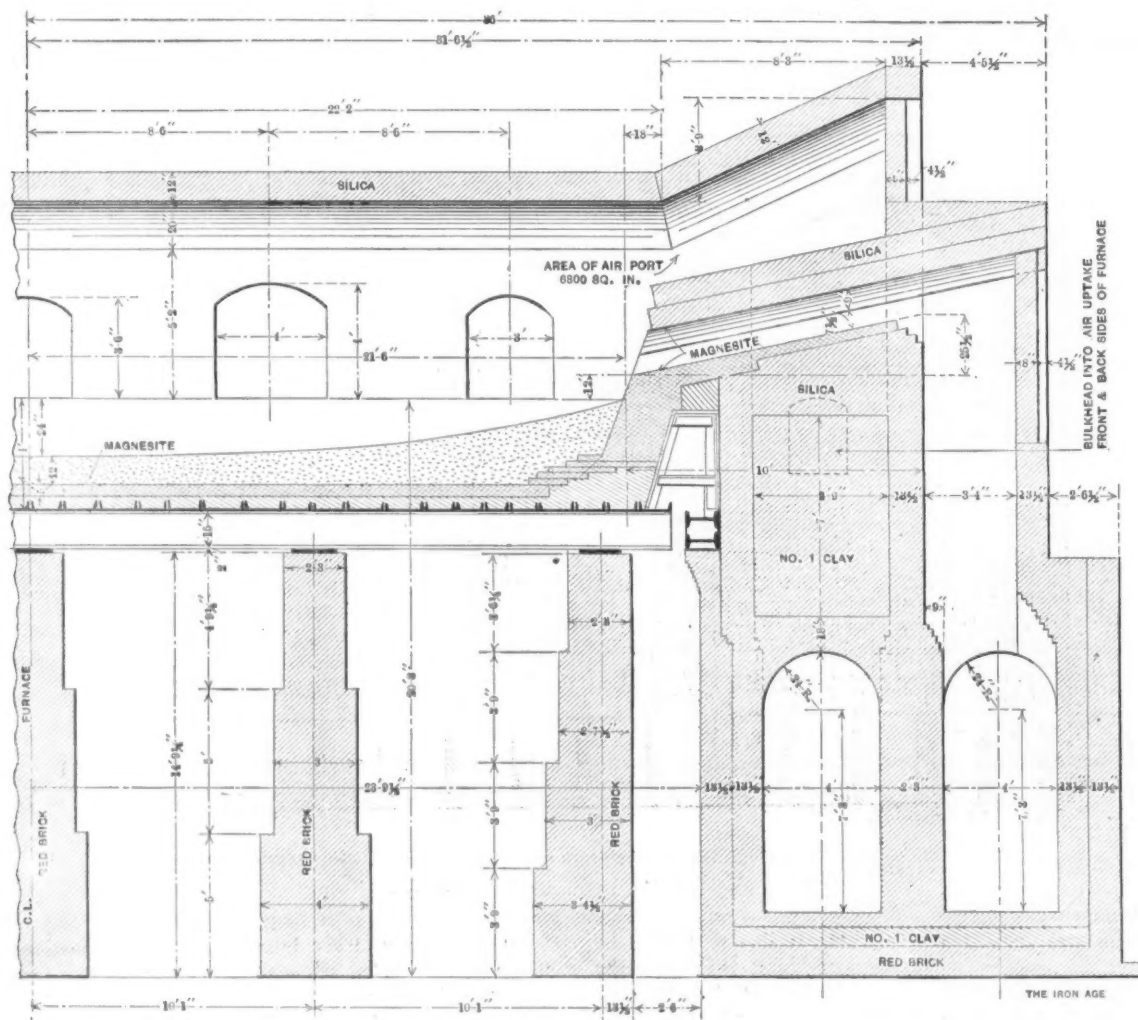


Fig. 4.—Longitudinal Section of One of the New Open Hearth Furnaces through the Ports.

ends. It has been demonstrated that 600 heats can be made with the long furnaces before it is necessary to rebuild completely. The best week's record of one of the new furnaces is 1260 tons of ingots, working from cold metal. The average fuel consumption for furnaces Nos. 7 to 11 has been 500 lb. of coal per ton of ingots, and for a single week a record of 414 lb. of coal per ton of ingots has been made.

The checkers in the regenerative chambers of the later furnaces are made up of 9-in. straight brick laid up dry, so as to form 3-in x 6-in flues in the gas chambers and 4 1/2-in. x 6-in. flues in the air chambers. A portion of the furnaces have the checkers built with staggered flues and other with straight flues. The staggered flues give a larger heating surface, but choke up more quickly.

The charging doors of the furnaces were originally water cooled, being of cast iron brick-lined and having a water jacket on the back and bottom. These doors

diameter, and are water cooled and water sealed. The cylinders for lifting the gas and air valves are controlled by 1-in. 3-way Aiken valves with levers so arranged that reversals take place without any loss of gas.

The Gas Producers.

The producer plant consists of 30 Laughlin 8-ft. and 20 Morgan 10-ft. gas producers. The former are hand fired and there are five for each furnace, set 12 ft. 3 in. center to center in a building 441 ft. long and 26 ft. 4 in. wide. Of the Morgan producers there are four per furnace set 15 ft. between centers in a building 420 ft. long and 24 ft. wide. The producers for furnaces Nos. 7 to 11 are provided with coal and ash handling equipment at each end. Coal is received on a track alongside the producer house and dumped into receiving bins beneath the cars. From these it is fed by means of a belt to a crusher and then drops into an elevator boot, a bucket conveyor taking it to four 190-ton overhead bins. These are built in

pairs, two at each end of the plant. The coal is distributed by means of a 5-ton crane equipped with a scale, all the coal thus being weighed. The construction of the gas house for the Laughlin producers is such that the crane runway could not be easily extended to it, and the coal is therefore conveyed by means of a bucket suspended from a 15-in. I-beam, motive power being supplied by a Sprague Electric Company mono-rail hoist. An operator travels with the machine in a small cage. The bucket is

few feet beyond and at one side is a light finishing train consisting of two 8-in. two-high stands. Any one of the three-high stands can easily be removed from its bed by a crane if the requirements of rolling demand it. Between the 16-in. and 12-in. trains is a conveyor driven from the main mill drive.

The mills themselves are all driven from an Allis horizontal-vertical engine 28 and 50 by 48 in.—the 16-in. mills direct from the main shaft, the 12-in. mills by belt

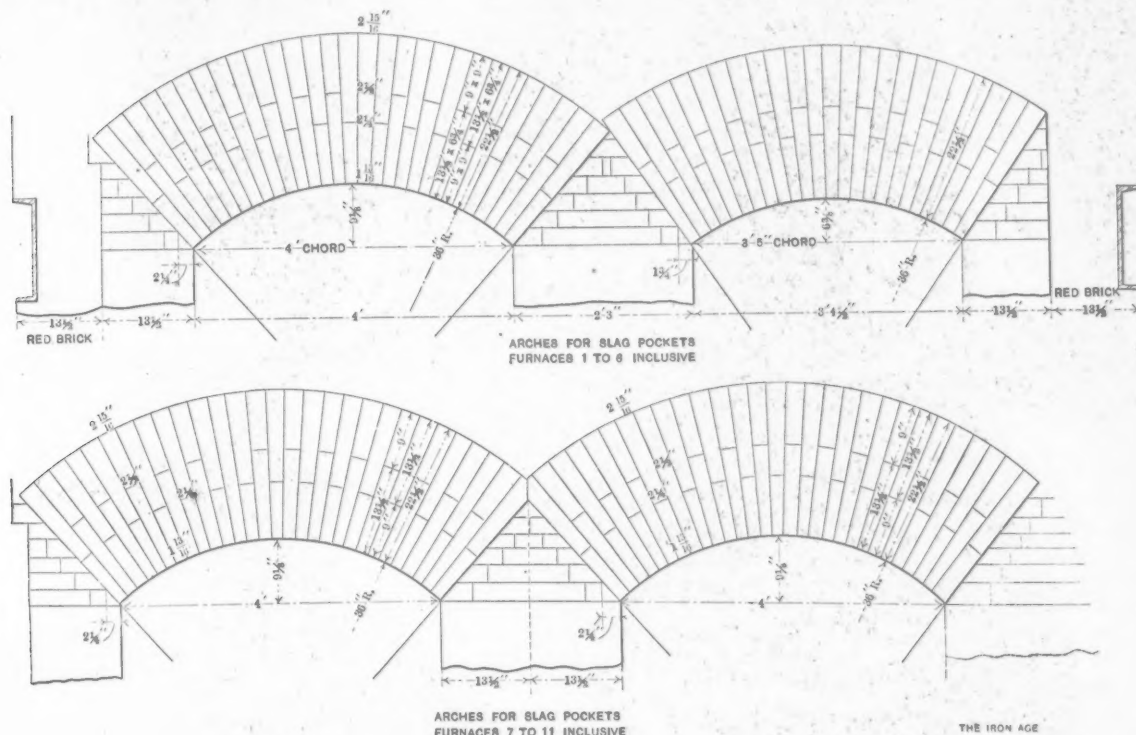


Fig. 5.—Details of Arches for Slag Pockets of Later and Original Open Hearth Furnaces.

filled from an overhead bin through a chute, the supply being controlled by the operator on the hoist.

Ashes are removed from a pan underneath each producer at frequent intervals, are placed in small narrow gauge tip cars holding 16 cu. ft., and pushed to the ash hoist alongside the coal elevators. The ash cars discharge their contents through a grating of 3-in. mesh, insuring the breaking up of the clinkers, into a bucket of 48 cu. ft. capacity. This is elevated by means of an electric hoist and the contents dumped into an overhead bin placed over the coal track. From this the ashes are discharged into standard gauge cars once in 24 hr.

The Merchant Mill.

This mill, designed and built by the Morgan Construction Company, Worcester, Mass., is intended to cover a wide range of material, including rounds and equivalent sections from 3 in. to $\frac{3}{8}$ in., flats up to 7 in., angles up to 4 in., beams up to 3 in., splice bars, &c. The maximum billet provided for is 6 in. x 6 in. x 9 ft. A general layout of the mill showing its principal parts is given in Fig. 11. The total length of the building is 700 ft. and the width 79 ft. Interior views are shown in Figs. 7 to 10.

Two billet heating furnaces of the continuous gravity end discharge type with an inside width of 10 ft. are provided. Provision is made for regenerating the air in chambers at the sides of the furnaces, but below the main floor line. Gas is supplied by four 10-ft. Morgan producers equipped with George automatic feeds, which are fed from overhead coal bins through chutes, so that no hand shoveling is required. Each furnace is provided with two pushers which may operate together or upon two lines of short billets. The capacity of the two furnaces combined is approximately 400 tons in 24 hr.

From these furnaces the material is delivered by a 140-ft. conveyor to the first train of rolls, consisting of three 16-in. three-high stands arranged abreast. Immediately beyond and parallel with these mills is a second train consisting of four 12-in. three-high stands, and a

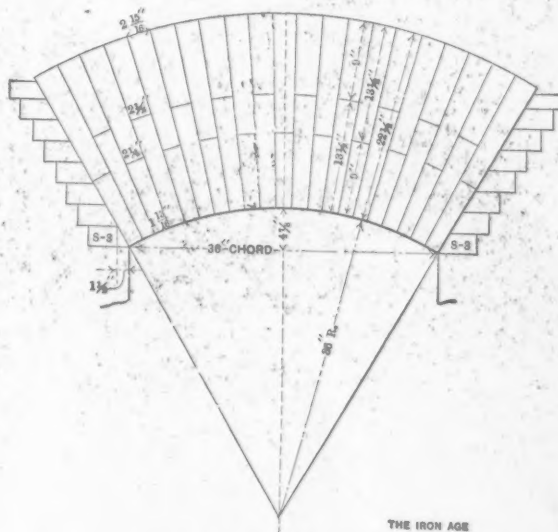


Fig. 6.—Arch for Gas Port for Furnaces Nos. 7 to 11.

from the engine flywheel, and the 8-in. mills from a jack shaft, also driven by this engine, extending under the main mill floor.

The most interesting feature of this plant is the provision for taking care of the finished product, the wide range, from 7 in. flats to $\frac{3}{8}$ in. rounds, presenting a somewhat intricate problem. This has been solved by providing two automatic cooling beds, one in line with the finishing pass of the 16-in. and the 12-in. trains, and adapted more particularly for material from the 16-in. mill, and a second of lighter construction, located directly beyond it, arranged to receive the product of the 12-in. and 8-in. mills. A small traction reel is also provided for light sections which are delivered in coils.

The 16-in. mill bed is 100 ft. long, and of the Edwards universal type, heretofore described in *The Iron Age*. In

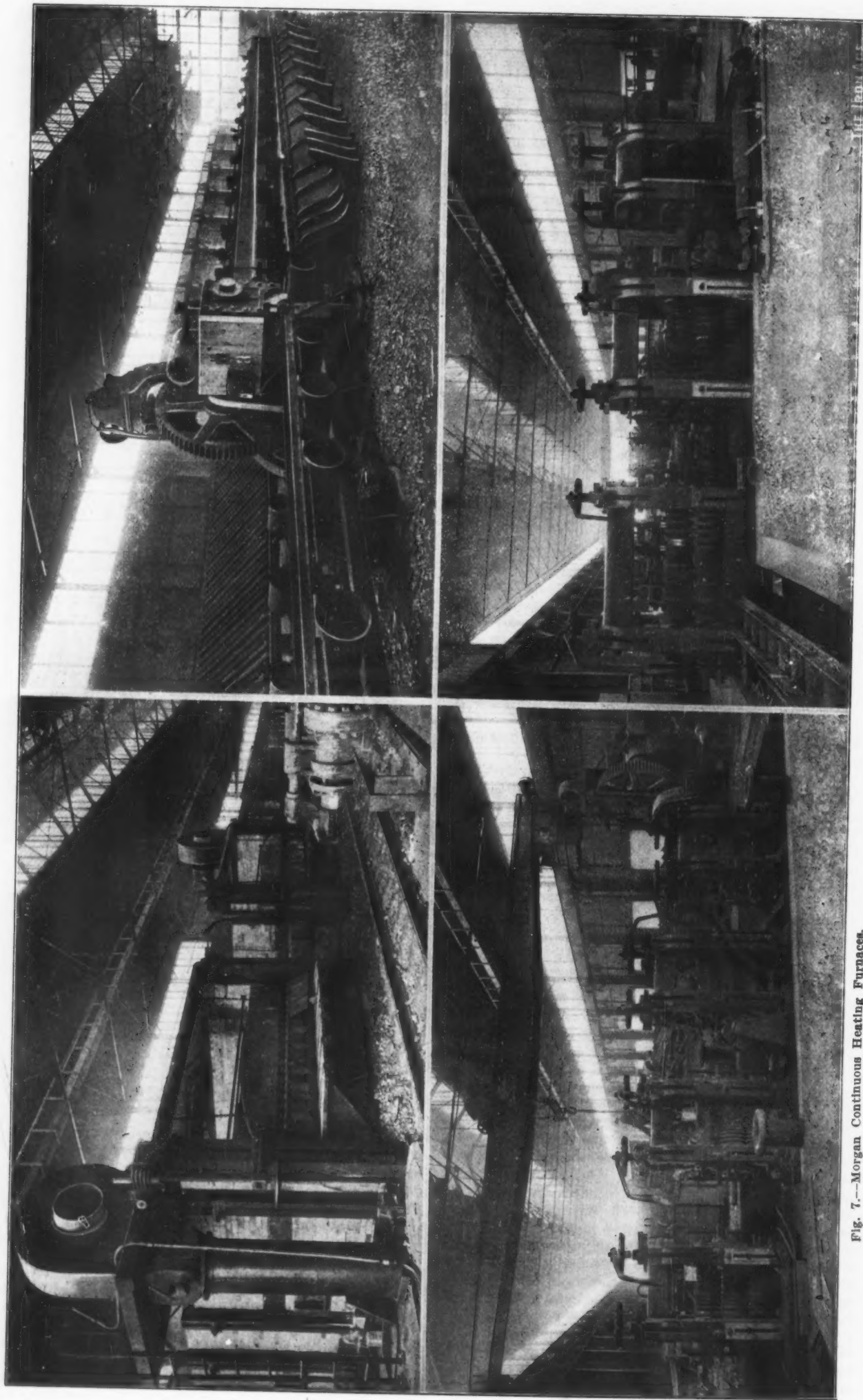


Fig. 7.—Morgan Continuous Heating Furnace.
Fig. 8.—The 12-In. Mill.

Fig. 9.—Sixty-Foot Table and Sneer.—A portion of the 200-Ft. Rolling Bed at the Left.
Fig. 10.—The 16-In. Mill.

The Merchant Mill of the Lackawanna Steel Company.

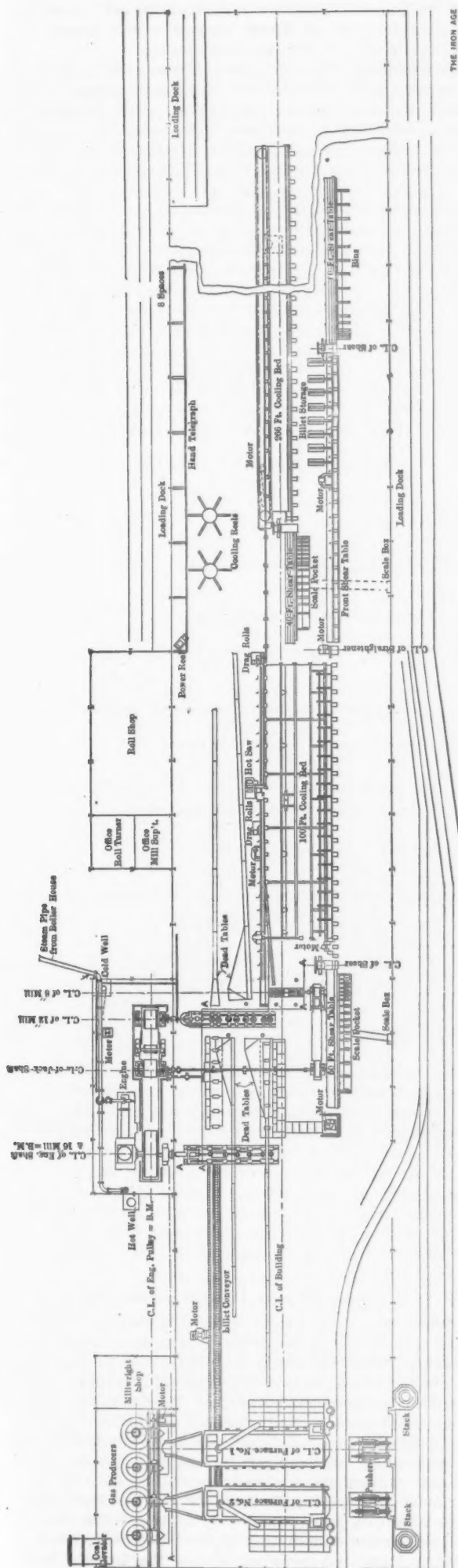


Fig. 11.—Plan of Merchant Mill.

this design the bars travel horizontally across the bed, being worked across by oscillating racks, the staggered teeth on each side of which engage the material alternately in their swing, and by a combined lifting and sliding movement deliver it to the receiving rails, from which the accumulated material is pushed on the receiving conveyor. The latter is arranged to deliver in either direction. If the material is sent back toward the mill it can be run against an adjustable stop and sheared in any length up to 50 ft. The accumulated material is automatically knocked off into bundling pockets resting upon scales, and when a bundle of sufficient size has been collected slings are placed around it and a crane delivers it to the loading yard. This method of handling the finished material is followed out in all the other shear tables referred to below.

If, on the other hand, the material is sent forward it will pass first through a straightener, if this is necessary, then to a driven conveyor 105 ft. long, from which it can be fed to a shear and to a 60-ft. back shear table, similar in design to that at the other end of the mill at which it is bundled, as before described. At one side of the 105-ft. conveyor and adjacent to the shear is a billet storage table on which bundles from the other shears can be deposited, and from which they can later be fed to the shear for reshearing. By this arrangement the capacity of the cooling beds is not limited by the capacity of one shear, as is sometimes the case when cutting short lengths. Near the middle of the delivery conveyor on this bed is placed a hot saw with suitable stops which permit the sawing of sections requiring perfectly square ends.

The bed for the 12-in. and 8-in. mill product is 266 ft. long, of the inclined escapement type, similar to those installed in the merchant mills at Duquesne, Pa. The material is delivered as cooled to the usual receiving conveyor, and by it sent back to a shear with a 40-ft. back shear table, where it is bundled, weighed and made ready for delivery. It was found that there were calls for some of the lighter sections in coils and for such orders a self-contained motor driven traction reel is provided, from which the coils are delivered to a six-arm cooling spindle, thence in turn to a hand telegraph and to the loading dock.

The merchant mill is served by two 10-ton and one 5-ton cranes. The boiler house contains four 350-hp. Munoz boilers.

The installation is a good example of a made-to-order plant covering a special and wide range of merchant and structural shapes for a moderate expenditure, and with the minimum amount of idle equipment.

Lake Shipments of Rails.

The extensive canal and docks of the Lackawanna Company have given facilities for water shipments on an unusual scale. The record of the Seneca Transportation Company, which is the subsidiary organization handling this traffic, is particularly worthy of note. In the season of navigation which closed in December the transportation company shipped to the head of Lake Superior for the Great Northern and Northern Pacific systems and to Canadian ports for roads in that country close to 170,000 tons of standard sections.

The rail loaders are situated on the west side of the canal, that is, on the side opposite the steel plant, and are used for loading rails from gondolas and flat cars into boats. Two jib cranes built of structural steel are placed upon the canal wall 48 ft. apart. The height of the mast is about 60 ft. and the length of the boom about 42 ft. These cranes have the three motions common to most jib cranes—namely, the main hoist and the boom hoist, which are operated by a two-drum hoisting engine built by the Lidgerwood Mfg. Company, and a side swing or rotary motion of the mast, which is operated by a separate engine built by the American Hoist & Derrick Company. The rails are handled by the derricks in sets of from 9 to 14, depending on the size of the rail, and the entire mechanism is under the control of one man. A plan view of the jib cranes and hoisting mechanism is shown in Fig. 12.

Some good records have been made with the rail loader, approaching much nearer those made in the hand-

ling of bulk material than might be supposed. In the past season a boat cleared from the docks at South Buffalo with a cargo of 2500 tons of rails in 25 hours after tying up.

Niagara Electric Power.

Reference has already been made to the contract of the Lackawanna Steel Company with the Niagara, Lockport & Ontario Power Company for electric current. The great extent to which electricity is used at the South Buffalo plant and the increasing demand upon the gas engine driven generators brought forward the alternative of securing outside current or making a large investment in additional buildings and generating equipment. The question raised was not one of the economy of gas engine power as compared with purchased electrical current. Under the contract with the Niagara, Lockport & Ontario Power Company a definite minimum horsepower will be taken regularly, and a portion of the steel company's gas engines will be used to take care of the peaks of the daily loads, while some of the gas thus far available for the engines will be burned under boilers, saving the coal heretofore required to raise a part of the steam supply.

Electric substations are being constructed within the

on the water consumption of the boroughs of Manhattan and the Bronx (310,000,000 to 320,000,000 gal. daily) the pumping capacity at South Buffalo would supply the wants of a city of 750,000 inhabitants.

One particular in which the progress made in the past three years has been marked is in the improvement of the yards. Not only has the company gained a considerable acreage by filling in portions of the water covered land included in its riparian rights, but the filling and leveling of yards following the period in which construction was given precedence over work of this character have changed the face of things vastly. What has been involved in this surface work may be judged from the statement that the space covered by the plant is about $1\frac{1}{2}$ miles long and $\frac{1}{2}$ mile wide. The increased economy in handling material in and out, now that the yards have approached more nearly their final shape, is no small item.

One of the changes of the past two years, illustrative of what has been done in meeting conditions as they developed in practice, is the substitution of steam locomotives for electric locomotives in the Bessemer department. The extent to which the use of electricity was provided for was one of the features of the original plans. In the

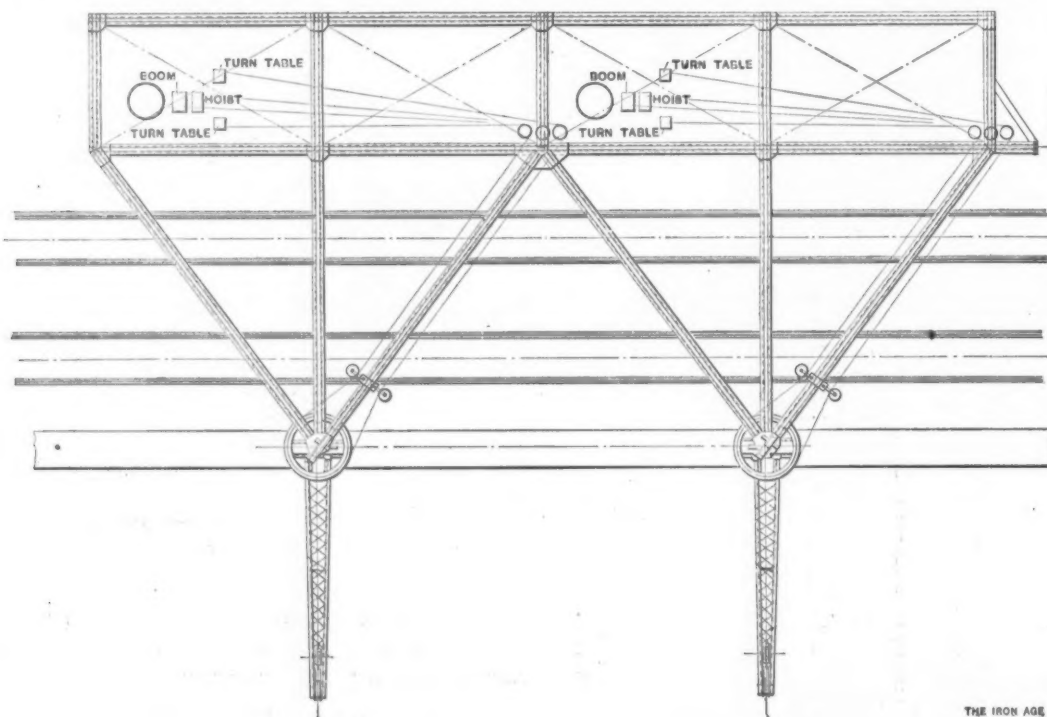


Fig. 12.—Plan View of Rail Loading Plant.

steel plant grounds for the transformation of 60,000 volt 3 phase 25 cycle power from a duplicate transformer line to a 2200 volt 3 phase 25 cycle distribution system. The initial equipment will consist of two 1000-kw. motor generator sets, one 500-kw. motor generator set and four transformers of 375 kw. each. From the main transformer station the 2200-volt current is taken to three feeder stations, at which it is transformed down to 220 volts for alternating current and 440 volts for direct current.

Heavy Water Consumption.

The added requirements of the more thorough gas cleaning now practiced, as well as the increased needs imposed by the important new construction of the past two years, have necessitated marked enlargement of the pumping plant. The original installation was five direct-acting duplex triple expansion pumps, each of 5,000,000 gal. capacity in 24 hr., furnished by the Wilson-Snyder Mfg. Company, Pittsburgh. It was expected ultimately to increase this to 60,000,000 or 70,000,000 gal. a day, but these figures have been far exceeded. Three Nordberg pumps of 20,000,000 gal. daily capacity were added, and more recently a fourth Nordberg pump of like capacity was ordered. When this installation is complete daily requirements of 105,000,000 gal. of water will be provided for, a quantity that suggests the cumulative advantage in one direction at least, of the Lake Erie site. Based

converter house short circuiting proved so troublesome that the change to steam power became imperative.

The new blast furnace, on which work is being pushed so rapidly as to indicate that a new construction record will be made, will bring up the company's pig iron capacity at South Buffalo to between 900,000 and 1,000,000 tons a year, allowing for the average idle time for relining and repairs. A conservative size has been adopted as the result of the practice of the past three years, the new furnace being 85 ft. high, 22 ft. bosh diameter and 15 ft. hearth diameter.

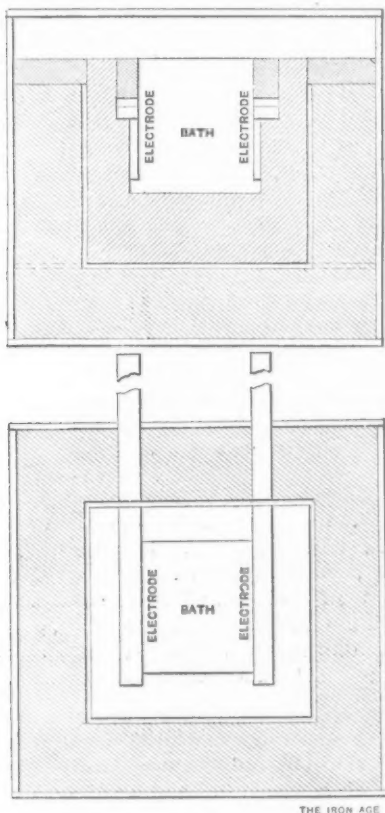
Consumers in the Tributary District.

When the Lackawanna Steel Company removed to South Buffalo it was one of the expectations that in time tributary industries would be established in the same district, and that in this way an outlet would be furnished for a considerable tonnage. Now that the Lackawanna plant has been fully rounded out and all the products originally contemplated are being manufactured, the location of consuming industries is a natural development. Among those already located or soon to build in the vicinity of the steel works are the Shenandoah Steel Wire Company, whose wire mills are now nearing completion; the Seneca Iron & Steel Company, which is building sheet and hoop mills, and the Buffalo Brake Beam Company, which has plans for extensive works adjoining the properties of the Lackawanna Company.

The Hardening of Steel in an Electrically Heated Bath.

During the past few weeks there has been exhibited at the Corporation Electrical Exhibition in Sheffield, England, an electrically heated furnace for hardening and annealing steel. The apparatus is intended to take the place of the ordinary fire and of the ordinary hardening and tempering baths. It is applicable to the hardening of steel tools of any shape and size. The temperature can be regulated with the greatest precision, and provision is made for changing the heat to suit steels of differing composition and for work requiring different degrees of hardening. A peculiar and admirable feature of the method is that it is impossible to overheat the article and therefore impossible to burn even the thinnest edge or the finest tool. Further, tools having thick and thin portions can be treated just as easily and satisfactorily as those having practically the same contour in all parts.

The apparatus will be understood from the sectional



Sectional Plan and Vertical Section of an Electrically Heated Bath for the Hardening of Steel.

plan and vertical section herewith reproduced from the *Electrical Review* of London. The crucible proper is built up within a cast iron case and is made of fire brick and clay. Upon opposite sides are electrodes of iron, the connections of which are well insulated within the fire clay lining. This lining, it may be added, is of such thickness that the outer casing always remains cool, so that but little loss of heat takes place.

The crucible is filled with pure chloride of barium in crystal form, which is melted by the current. This salt is used alone for the higher temperatures, and the bath can be maintained at any desired point in the range between 100 and 1400 degrees C. For lower temperatures a combination of the chlorides of barium and potassium are used. This acts in precisely the same manner as the alloys of metal; the melting point is lowered. With this mixture a temperature as low as 750 degrees C. can be obtained. The cost of the charge is of minor importance, since both salts are very cheap; it is placed at from \$4 to \$5 for a bath holding 100 lb. Since there is no loss, the first expense is the only one for material.

After having been used the salt sets solid and is melted again by sprinkling a line of fresh crystals from one electrode to the other, or by starting an arc at one electrode with a flexible conductor carrying a carbon point. This will start the melting, which will quickly spread through the entire mass, only about one-half hour being required.

The alternating current is used, since there is no electrolytic action with it and it facilitates the regulation of the pressure across the bath. In the furnace employed at the exhibition, the bath of which was 12 x 12 x 14½ in., the current was 200 volts single phase, 50 periods, and the pressure between the electrodes could be varied from 10 to 20 volts. The consumption of current varied from 20 to 48 units per hour, according to the working temperature and the amount of material operated upon. The rate of consumption is stated to vary from 1.10 watts at 750 degrees C. to 49.20 watts at 1300 degrees. per cubic inch of mixture in furnaces of medium size, the results being better in large furnaces.

With the current at a steady pressure an ammeter in the circuit affords a quite reliable check upon the temperature, but more precise temperatures are obtained with the aid of pyrometers. The temperature of the molten mass is uniform in every part of the bath, with the single exception of a very thin layer at the top. When the desired temperature has been secured the article to be treated is lowered into the bath and is soon raised to the same heat with perfect uniformity throughout its entire mass, irrespective of the shape of the article. As stated, there is no danger of burning the thinnest edges, nor can there be any trouble from unequal expansion.

Some of the results are thus summed up:

"With twist drills made of high speed steels most satisfactory results were obtained, the time taken to bring them up to the required temperature, 1300 to 1350 degrees C., being very short. It was demonstrated that with two men working over 150 twist drills up to 1½ in. in diameter could be successfully hardened in one hour. Milling cutters varying from 1½ in. in diameter and ¼ in. in thickness to 6 in. in diameter and 11 in. in length were treated. A cutter of the latter size was plunged into the bath without previous heating and was brought up to the required temperature in 14 min., as against 1½ hr. which would be required by the methods at present in use.

"It was shown that the heating was regular and had permeated the tool thoroughly without causing stress or risk of cracking; no oxidation took place nor were the edges burned in the slightest degree. Lathe and planer tools gave similar results, many sizes up to 2 x 2 in. being hardened. At lower temperatures, from 750 to 1000 degrees, high carbon steels were treated; files of all sizes and sections, woodworking tools, table knives, steels for knife sharpening, razor blades, springs and spring steel, steel wire, &c., and the results in all cases satisfied the manufacturers, who had obtained them with their own men accustomed to the usual gas or coke ovens."

The cost of running the furnace is about that of a gas furnace of the best design, but the output per man is far greater with the new furnace. At the same time faulty work is almost unknown.

Two years ago an engineer succeeded in utilizing electric waves to explode torpedoes at a distance, to light incandescent or arc lights, and to set in motion both electric and steam motors. A serious drawback is in the mast required to collect the waves and transmit them to the receiving machine, since the pole is in itself an indication of danger and reveals the existence of the explosive. A French engineer has recently produced an apparatus for receiving these waves which is said to be highly sensitive and of great precision, to work under ground or water and to use no mast. This machine is in the form of a cube weighing about 7 lb. and is said to be capable of easy transportation, while the cost of manufacture is placed at \$10. The consul reporting this remarkable invention does not further describe the apparatus.

Wire Drawing: The Second Step in a Useful Art.

Story of the Invention of the Multiple Die System.

BY W. W. GIBBS, GENERAL MANAGER SHENANDOAH STEEL WIRE COMPANY.

Metallic shreds, known in these modern times as "wire," have been discovered which date as far distant as 1700 B. C. The sacerdotal robe of Aaron was decorated with "wire of gold," and the antiquarian visiting Kensington Museum in London may feast his eyes upon wire made in Nineveh 800 years B. C. All these metallic shreds, or wires, during the 17 centuries before the coming of Christ, and for an added 13½ centuries thereafter, were fashioned by the skilled artisan under man's first efficient tool—a hammer. These facts and recorded dates show that from 1700 B. C. to 1350 A. D., a period of 3050 years, wire was made by processes so crude and expensive that production was limited to the precious metals.

The Invention of the Draw Plate or Die.

Not until Rudolph of Nuremberg, Germany, "skilled in metals," conceived the idea of drawing metal through a perforated plate of steel—now known as a "draw plate" or "die," and used such dies successfully in practice—was any forward step taken toward the present art of drawing wire, and this was the first step. His invention so cheapened production that iron, and later steel in the form of wire, was added to the commodities man finds so necessary and useful in his civilization. A casual visitor to-day to any wire mill in the world will find the draw plate of Rudolph of Germany exclusively in use. Five hundred and fifty-five years—five and a half centuries—have rolled on since the days of Rudolph, and now the second step in the art of making wire has been taken, and it is this story I propose to tell.

It is not the purpose of this article to enter in detail into the treatment of steel and the manufacture of wire, except in so far as may be necessary to convey to the intelligent reader the revolutionary character and the economies in production which will result by reason of the inventions I shall describe. The greatest cost incurred in the manufacture of steel wire is the "reducing" it from the larger diameters at which it is received from the rod mills, where it is rolled hot into the various smaller sizes at which it is marketed. Agricultural fence wire is cheaper to produce than poultry fence wire, while the still smaller diameters, or gauges, used for fly or mosquito screen cloth, are still more costly, the cost per ton being in the ratio of the number of operations necessary to reduce from the large diameters to the small.

For the purposes of this article the word "steel" will be used where either iron or steel is intended to be described, and the word "die" will be used for the term "draw plate." And now for my story:

The Origin of the Invention of the Multiple Die.

A gentleman whose business was and is the manufacture of high grade metal working machinery, who possessed no special knowledge of wire or interest in that subject, was sitting in his library in New York in 1903 idly turning the leaves of an encyclopedia, stopping to read an occasional article, when he was startled at the statement under the subject "Wire Drawing" that, of all patents applied for to the United States Patent Office up to 1889 only three of such patents pertained to the art of drawing wire. A moment's reflection led him to conclude that thousands of men must be engaged daily in that art, and the paucity of effort looking to improvement, as shown by the application for only three patents during so long a period of years, justified the conclusion that little effort was being made by inventors in that direction and that a great business opportunity was presented.

Acting upon this thought James A. Horton, chief engineer of the Iroquois Machinery Company, one of the companies under the control of the gentleman above

referred to, was called from Providence, R. I., to New York that night. The following morning, through the courtesy of *The Iron Age*, a list of every wire mill in the United States and Canada was secured, and the same night Mr. Horton, acting under instructions, left New York to visit all the wire mills so listed, relying upon the courtesy of their owners and managers to permit him by personal inspection to learn how wire was drawn and the mechanical appliances used therefor. Some of the wire mill managers gave him every opportunity to study the art, and to those of them reading this article who recall his visit he and his associates feel indebted.

Wet Drawn and Dry Drawn Wire.

Steel wire is drawn by two processes, called respectively "wet" or "liquor drawn" and "dry drawn." Nominally all wire of No. 15 gauge and smaller is drawn "wet," and the larger sizes are drawn "dry." A coil of wire rod weighing approximately 150 lb. (the diameter of the wire rod being about 1-5 in.), is received from the rod mill, dipped in acid to remove the scale—due to being rolled hot in the rolling mill—then in water to wash off the acid, then in lime water to stop the action of the acid, then placed in an oven and baked 10 to 24 hr. to drive out any acid remaining on or in the wire; it then goes to the wire drawing room and is placed on a reel, one end pointed, and pushed through a conical hole in a small piece of steel known as a draw plate or die; the hole in the die being smaller than the wire, a short length is pulled through by mechanical means and fastened to a drawing drum; the latter, caused to revolve, draws the wire through the die, coiling it as drawn on the drum, when it is removed and placed upon another reel to be again drawn, successive drafts being made until the desired size is reached. Each drawing is known as a "reduction," the wire after each drawing being the diameter of the hole in the die plate. "Liquor drawn" is a term used to signify that the wire—as in the smaller sizes—is dipped in a solution of sulphate of copper and then called copper coating, and then submerged in a liquor made of rye meal and water which has been allowed to ferment.

The above system of drawing through one die at an operation, and repeating, we will designate as the single die system. We will call the new process the multiple die system, which consists in drawing a coil of wire through a number of dies at one operation.

After several months' travel and investigation Mr. Horton (hereafter designated as the inventor) made an official report describing the single die system, and expressed the belief that he could produce a machine which would enable steel wire to be drawn through a number of dies (instead of one) in one operation.

Previous Failures in the Same Direction.

Investigation showed this idea was not new. Its desirability had been recognized for many years, and various abortive attempts had been made in this country and in Europe, some of which had shown great financial courage and persistence on the part of the capitalists and inventors.

Little was known by the inventor or the officers of the Iroquois Machine Company of the difficulties which had been encountered and found insurmountable by previous pioneers, but so tempting seemed the reward, should they be successful in revolutionizing the art of steel wire drawing as now practiced, that it was determined to make a scientific and analytical study of the subject, and if the results and conclusions reached seemed to justify they would incur the expense of time and money which might prove necessary in an effort to solve the problem.

To the wise counsel of the president of the company,

Edwin A. Smith of Providence, R. I., whose sound judgment and consistent courage in coming liberally to the financial aid of the company during seasons of doubt and trial; to Henry E. Babcock, treasurer, ever hopeful and full of resource; to Lucius F. Arnold, manager of the Providence works, all of whom at all times and to the best of their several abilities were helpful in furthering the efforts of the inventor, is due much of the credit for bringing these inventions to a useful and final success.

The First Difficulty Encountered.

The initial difficulty heretofore met with in efforts to draw steel wire through a number of dies in one operation, and which immediately confronted us, was the fact that after the wire had passed successfully through the first die and around the drum by which it was drawn, an effort to pass it through a second die would cause

materials not mentioned here, all without success. The inventor then conceived the idea that the drum, which we will frequently term hereafter "wire forwarding means," must be of a material softer than the wire. Acting upon this theory, a wire forwarding means composed of a disk of wood fibre was clamped between two metal disks. This was found to remove the difficulty to an extent, but did not prove successful for regular commercial practice. Its partial success encouraged us to believe we were on the right track. Further experiment showed that the wire forwarding means when made of bronze (a material similar to the coating on the wire) produced the best results. It was too soft to remove by friction much of the copper coating on the wire, because of the variation in speed of the drum and the fleeting upward of the wire previously mentioned, and possessed the added advantage of restoring to the steel surface of

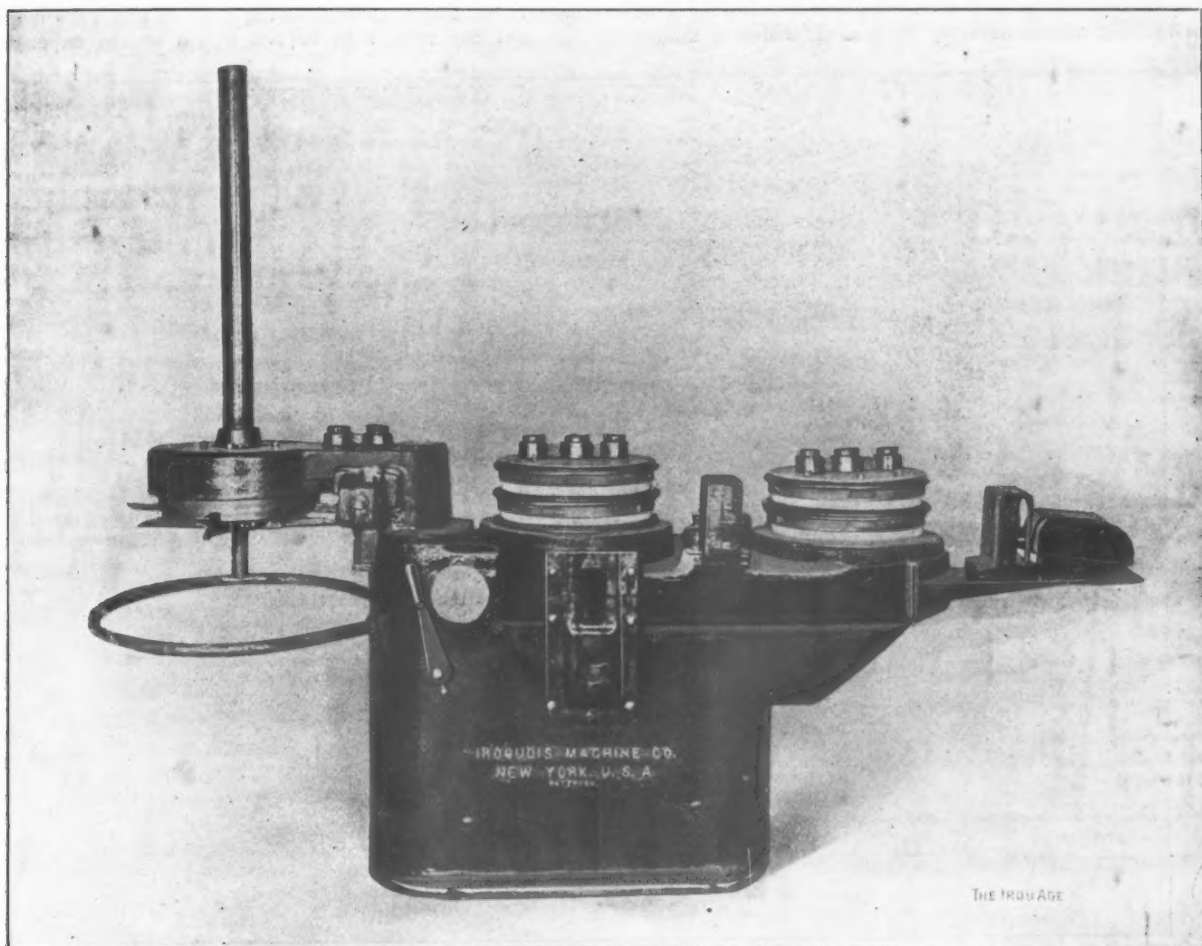


Fig. 1.—The No. 2 Multiple Die Machine, for Reducing No. 5 Rod to Nos. 10 to 15 Wire.—The Wire Is Drawn Dry on This Machine.

the wire to break. Careful observation showed that after the wire passed through the first die and reached the drawing drum, the oncoming wire, the latest through the die, crowding the preceding wire, wraps upward, called "fleeting," scratching and roughening the wire just to the extent that its surface came in contact with the metal of the drum. It was further injured because the drum traveled at a speed different from that of the wire; hence, when an attempt was made to pass or draw the wire through the second die, instead of the copper coating being intact for the whole circumference of the wire it was only partially so, and that portion from which the copper coating had been removed coming in contact with the steel of the second die caused it to clog and stop up and the wire to break.

Not knowing, we followed experiments and theories which, later, we found had been tried by earlier inventors. The theory was that the drawing drum must be made of a material so hard that it would not readily cut or wear. This we found impracticable.

Found That the Drum Must Be Softer Than the Wire.

We tried case hardened steel, chilled cast iron, ground glass, ground porcelain, and a number of other hard

materials, through attrition, a copper recoating simultaneously with the removal of the original coating, due to friction.

We had been under the conviction that if this initial difficulty could be overcome the question of drawing steel wire through a multiple of dies in one operation—the ambition and hope of steel wire manufacturers—would be realized.

The Next Difficulty to Be Surmounted.

We soon discovered we had only entered the woods. The smooth and inviting plains beyond were miles away. Had we appreciated this fact then this story might never have been written.

In drawing the finer sizes the sudden shock to the wire caused by starting the machine, added to the strain due to the reduction at the die, we found sufficient to break the wire. This was overcome by making a wire forwarding means of such elastic nature that it would yield slightly, but enough to soften the shock momentarily until the full speed of travel through the die was attained.

In drawing wire by any process, as the wire passes through the die it is elongated in exact ratio to the amount of reduction at any one die. The diameter of the

wire being reduced, the length of the strand is increased, the weight of metal in the piece being the same. Such elongation is not a factor to be dealt with under the existing single die system, but when, as in the multiple system, the wire is to be delivered to a succeeding die by a drawing drum or wire forwarding means, the elongation has to be taken care of or a loop is formed if the drum is delivered too fast or the wire is broken if not delivered fast enough. To overcome this difficulty we established by exhaustive experiment the amount of elongation under fixed conditions, then by mechanical devices arranged the speed of the wire forwarding means to meet the elongations of the wire.

Only One Finishing Drum Required for a Series of Dies.

In the single die system a die for each drum and a drum for each die are used. In drawing fine wire by the multiple die system only one finishing drum is required to a series or number of dies, the other dies having a wire forwarding means mounted on a ring, which is mounted

3. Lubricate such running mechanism of the machines as would be continuously immersed, without injury or stoppage from becoming gummed up.

4. Having qualities that would prevent fermentation, and would not become rancid.

5. Sufficiently cheap as to cost to permit of its being used freely.

We finally succeeded in producing a chemical combination which fully and satisfactorily met our needs. This liquor is given a free circulation through the machines by a pump.

The above description of some of the difficulties encountered and how overcome in the drawing of wet drawn wire is as full as the length of this article will permit, so we now turn to dry drawn wire and a partial description of the multiple die machine.

Difficulties Surmounted in Dry Drawn Wire.

The coarser sizes of wire are usually drawn dry, no liquor being used as in drawing wire of small diameters. To coat the wire with copper would be too expensive.

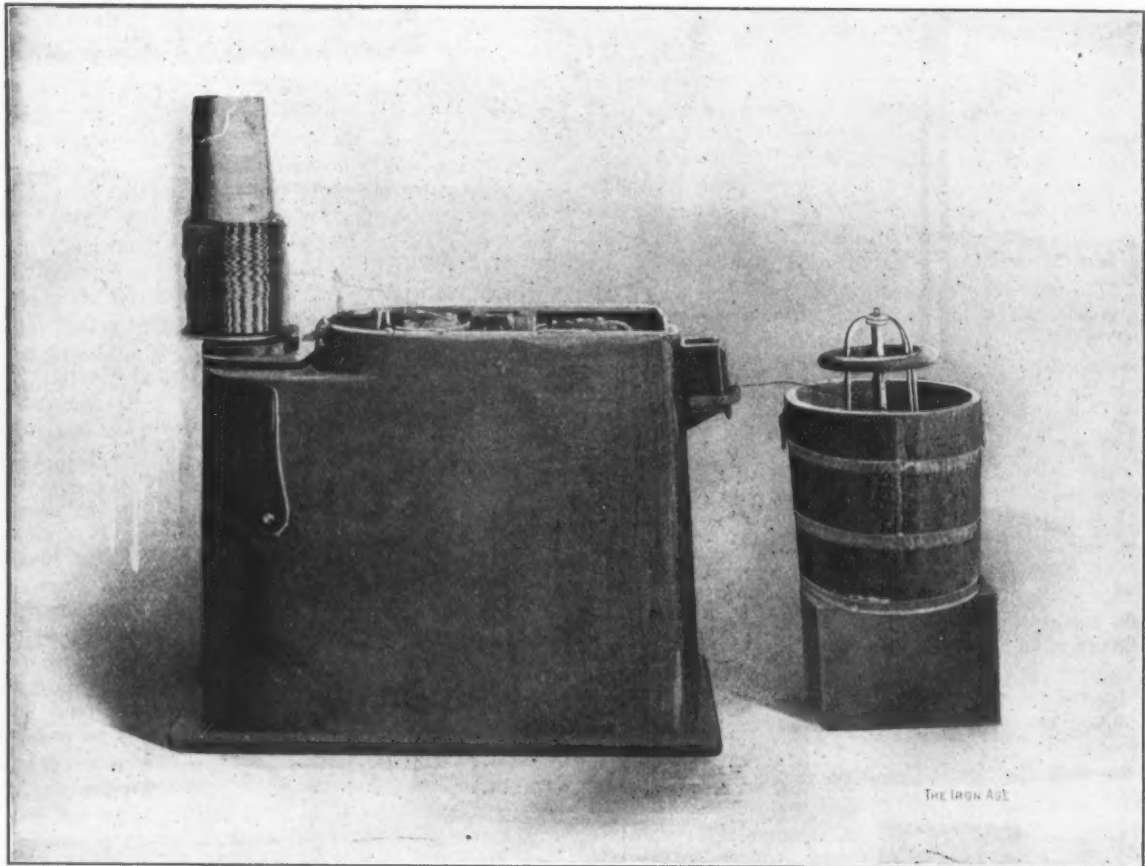


Fig. 2.—The No. 5 Multiple Die Machine for Wet Drawing from No. 20 Wire to the Finest Sizes, the Finishing Drum Being 8 In. in Diameter and Running at a Speed of 250 Rev. Per Min.—The Base of This Machine Is a Tank Containing the Special Liquor Used for Lubricating the Wire While Being Drawn.

on a stationary hub on the machine around which the ring is caused to revolve. There are two hubs to each machine. On them tiers of rings are mounted, one for each die, and these carry the wire forwarding means, all being positively driven by gears within the hub, which are in turn driven by a central shaft. This enables the several wire forwarding means to be so placed as to utilize both planes of the tangents of the rings for dies which are faced in opposite directions, as the wires on tangent lines of two tiers of rings travel in opposite directions. This arrangement facilitates the operation of machines and economizes floor space.

The Liquor Used for Wet Drawing.

The liquor used in the single die system proved absolutely worthless except for the first die. For nearly two years we struggled with this one difficulty, and to overcome it expended more than \$100,000. The liquor so essential to our success had to possess the following qualities:

1. A lubricant for the wire in its passage through the dies.
2. So little injurious to human flesh that an operator could allow the fingers and hands to become wet with impunity.

After cleaning the coils or bundles are dipped in a tank of lime coating, then put in an oven which dries the coating, causing the wire to look as if it had received a liberal coat of common whitewash. It is then drawn by the one die system through successive operations, one die at a time, until the desired diameter is secured.

In drawing these coarse wires by the multiple system we found such a tremendous cutting strain was exerted on the soft bronze metal of which the wire forwarding means was composed that the same means we had provided in the wet wire machine for the yield to overcome the shock of starting was totally unsuitable. This was a condition unforeseen, and it looked for many months as if, notwithstanding we had been successful in drawing the finer sizes of wire by the wet process, we would fail to master the dry process. The great tonnage in coarse wire for nails, heavy strands of fence, barbed wire, &c., was an important and much the larger part of the total tonnage.

Our feeling of disappointment was acute, but here again the genius of the inventor rose equal to the occasion. His theory, which proved sound by experiment, was

that the wire forwarding means must be made up of a series of shoes, each shoe being the segment of a circle. In the wet drawing machine the wire forwarding means was positively driven. In the dry machines we found the wire forwarding means must be driven frictionally. In other words, the shoes must be so constituted that they could not slip and at the same time grip the outer surface of the drawing ring sufficiently hard to draw the heavy wire through the die. An ingenious device successfully accomplished this, and the ability to draw dry wire and from the large diameters through a multiple of dies was definitely determined.

Avoiding the Heavy Lifting in Existing Wire Mills.

In existing mills using present methods the bundles or coils of wire rods usually weigh from 120 to 150 lb., being so limited because each time the coil is drawn through a die the operator has to lift it by hand from the drawing drum to place it on a reel, that it may be drawn through another die. Coils heavier than 150 lb. would be too heavy and unhandy for the operator to lift. To do so during the hours of an average working day

The reduction of wire at the die causes it to become hot in both systems of drawing. We overcame the difficulty because in this condition, wrapped on the wire forwarding means which is in close contact with the ring on the hubs, the heat is transmitted to the interior chamber of the hub, through which a constant stream of cold water is forced to carry the heat away.

Each die is contained in a holder so arranged that a thin copper bushing separates the die from a stream of water flowing within the holder and around the bushing. The above cooling arrangements permit more lineal feet to be drawn in a given time than could otherwise be accomplished, and increases the life of the die, allowing larger coils to be drawn, which saves the operator's time for threading, enabling him to run more machines, as each unit requires less attention. Our means of cooling the die enables us to draw 600 lb. coils as against 150 lb. by present methods.

A Device Made for Leading the Wire Through Each Die.

To make the multiple system practical for the coarser wires some method had to be devised to lead or string

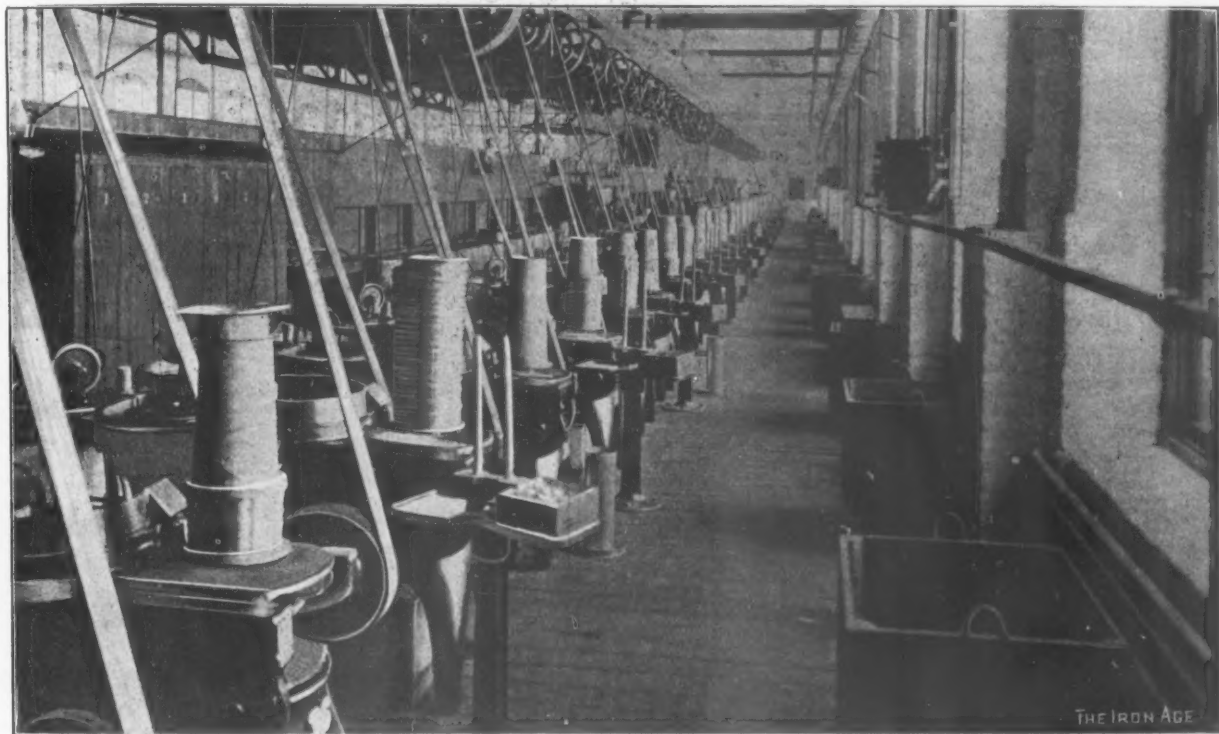


Fig. 3.—Wire Drawing Room, Showing 36 No. 4 Multiple Die Machines in Operation

would be so exhausting as to be beyond human endurance. An operator drawing 4000 lb. of No. 5 to No. 14 by the single die system must lift and carry 12 tons during 10 hours, while with the multiple system not a pound is lifted, only the end of the rod while pointing it.

Another heretofore unsurmounted difficulty has been that the conical hole in the steel draw plate or die would not remain "on size" to allow more than 150 lb. to be drawn through the same die in one draft.

Preventing Dies From Changing Shape by Friction.

It should be remembered that all wire is drawn to gauge, that is, of approximately even diameter through the total length of the strand. If the conical puncture, or hole, through the die, made to reduce a wire to a given diameter, becomes heated by the friction of the passage of the wire through the hole of the die, and this causes the die to cut out or become "off size," the die must be removed by the operator, which necessitates the cutting of the wire at the point where it began to go off size, and a new die must be substituted through which to draw the remainder of the coil.

Study and experiment demonstrated that if we could keep the draw plate cool and reasonably free from heat, caused by friction, coils of greater length and weight could be made, which is a most important consideration in cheapening cost of production.

the wire through each die and around each wire forwarding means until the finishing drum was reached, to which it was to be fastened. A flexible tractor was made, fitted with suitable grippers to engage the end of the wire, which had been pointed and pushed through the die, the other end being fitted with one part of a peculiar lock, the other part of the lock being a part of the revolving ring. The arrangement is such that the operator may connect and disconnect the tractor to or from the ring, whether the latter be in motion or not, or whether pulling the wire a load of 1000 to 2000 lb., the amount of strain not affecting the locking or unlocking device.

Trouble with the Finished Drum.

The ability to draw heavy coils of wire in one operation through a machine created a demand for some arrangement to lift them from the finishing drum different from those at present followed. A man can lift and carry 150 lb., but not 600 lb. We determined to invert or turn the finishing drum upside down, so that the wire would wrap around the drum as drawn, traveling downward instead of upward. Then the operator could, when the drum was at rest, tie it up as a bundle and by releasing a sustaining lever cause it to drop on a conveyor running even with the plane of the floor, which would carry it to the special department to which it was

next to go, or to the shipping room. Our astonishment was great when we found that a plain, substantial, old fashioned drum, well behaved and useful when used in the orthodox way, would not draw wire when turned upside down. Careful analysis and repeated efforts caused us to abandon the use of a finishing drum on the larger machines for drawing coarse wire.

We then produced a ring with a cylindrical surface stepped to different diameters but without taper, the first step adjacent to the flange being only sufficiently wide to hold enough wraps to keep them steady and permit the oncoming wire to crowd a preceding wrap off the step and on the next step, which, being smaller in diameter, allows the wire to slip freely on the succeeding step. Below these steps and parallel to the axis of the ring is a circle of rods on which the wire is bunched and sustained until the coil is complete. A series of sustaining arms support the increasing weight of the coil from start to finish through the medium of a spring, which also weighs the

No. 2. A five-die machine for reducing No. 5 rod to sizes from Nos. 10 to 15; finishing drum, 22 in. in diameter; speed, 130 rev. per min.

No. 3. A five-die machine for reducing from No. 12 to No. 18; finishing drum, 16 in. in diameter; speed, 130 rev. per min.

No. 4. Wet machine, seven or eight dies, for reducing from No. 14 to No. 24; finishing drum, 8 in. in diameter; speed, 200 rev. per min.

No. 5. Wet machine, nine dies, for reducing from No. 20 to the finest sizes; finishing drum, 8 in. in diameter; speed, 250 rev. per min.

Fig. 1 shows a No. 2 machine and Fig. 2 a No. 5 machine. The former is for dry drawing from a No. 5 wire rod to Nos. 10 and 15 wire, and the latter for wet drawing from No. 20 to the finest sizes.

It may be well to state in this connection, for purposes of comparison, that No. 33½ wire is drawn in mills using the single die system machine on an 8-in. diameter drum speeded 60 rev. per min., making 125 lineal feet of such wire per minute, or 22.5 lb. per hour, the wire having been drawn previously from No. 21½ through six

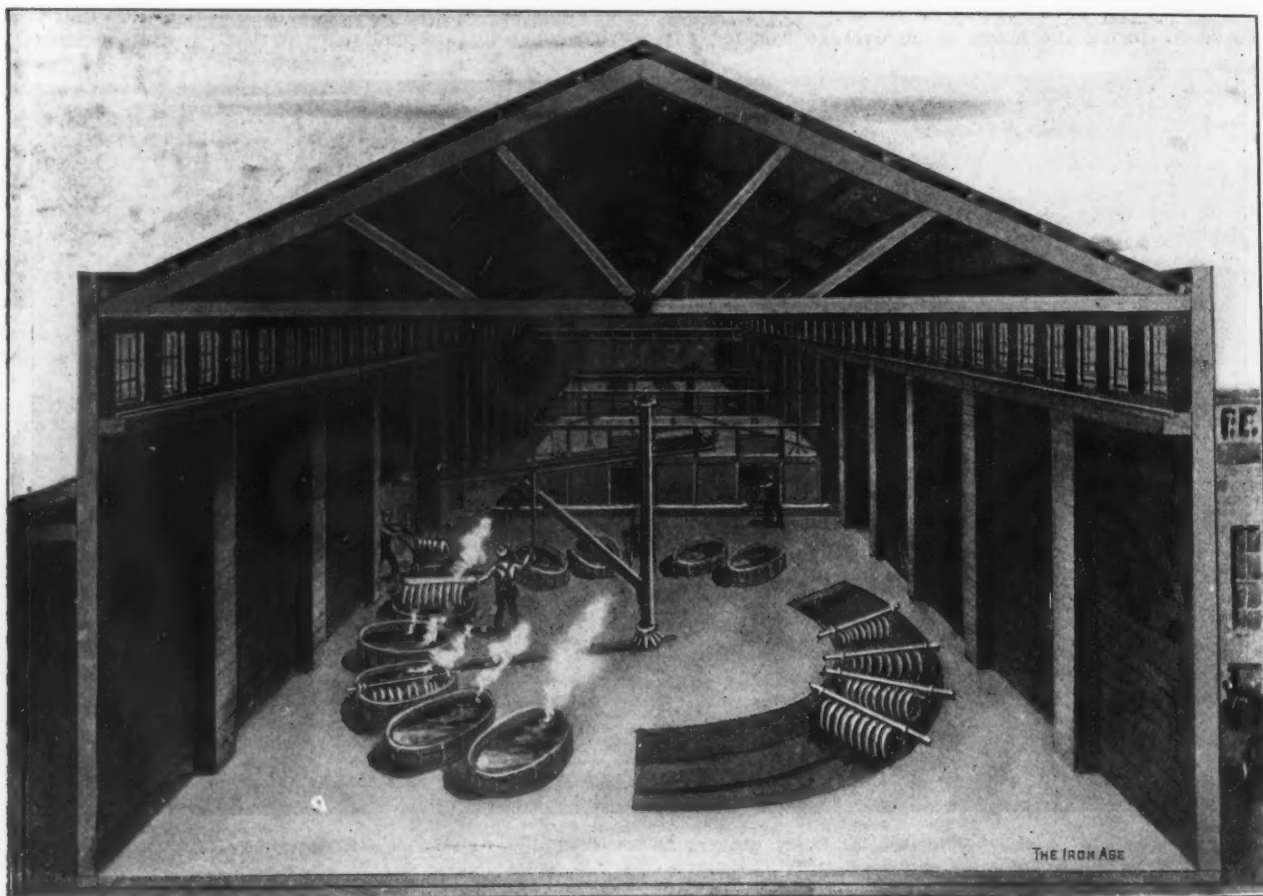


Fig. 4.—Arrangement of the Cleaning Room of the Shenandoah Steel Wire Company, an Overhead Electric Traveling Crane Commanding the Entire Room.

coil. When the machine automatically drops from high speed to threading speed, the coil being complete, the operator trips the supporting arms, which drop to a vertical position, and the coil falls on the conveyor running below.

Number and Range of Machines.

The value of the multiple die system having been fully determined, the number and range of the machines were taken up for consideration. We recognized the feasibility of building a machine which would take a No. 5 rod and in one continuous operation complete wire at No. 18 gauge, the limit being reached at this point, not through any inability of the machine to carry it further by the multiple die system, but because of the increasing hardness of the metal of the wire.

Such a machine would not, however, secure the greatest economy in cost of production, for the reason that through the factor of elongation the starting reel from which the No. 5 rod was pulled would revolve at a very low speed. In view of this fact it was determined to build machines of five sizes, as follows:

No. 1. A three-die machine for drawing coarse rods; finishing drum, 28 in. in diameter; speed, 100 rev. per min.

dies, each being a separate operation. In the multiple die system the No. 21½ wire enters one end of the No. 5 machine and in one operation the coil is completed on the finishing drum, which revolves at 250 rev. per min., or 523 lineal feet per minute, producing 10 lb. per hour.

Added to the advantages shown by the above comparison of speeds a less number of annealings is required, the technical reasons for which the length of this article will not permit us to enter into. In the case of card wire produced in English mills the wire is subjected to five and six annealings. The highest English authority, who is the largest producer of card wire in the world, stated to the writer, during a recent visit to this country, that as the result of tests made over a period of several weeks with English and German rods brought by him specially to this country to run on our multiple die machines, with such machines in his mill he would save two and possibly three annealings.

Having accomplished the drawing of steel wire by the multiple system we turned our attention to the draw plates or dies.

The Draw Plates or Dies.

When a coil of wire is drawn through a die the hole wears and it becomes necessary, before it is again used, to resize it. This is done by hammering the face of the die with a hand hammer until the metal around the hole is compressed inwardly and the hole is made smaller. A tapering mandrel, called a driving punch, is driven in the hole, which swages it to proper diameter and shape, being a very delicate operation and one requiring a high order of skill and experience. The driving punches are ground to the proper taper and size on a grindstone and are more or less imperfect, the taper never being the same in any two punches and none being more than approximately round.

is but 1-100 of that at present, and doing away entirely with the skilled die maker.

The Quality of the Wire.

The quality of the wire when drawn by the multiple die system is superior in every respect, being more evenly and uniformly round, due to the superiority of machine made dies. The tensile strength is greater, because the metal of the wire is less harshly and more gently treated, due to the use of more dies for a given reduction, making a less reduction at each die. If this was done by the single die system the cost of drawing would be too great. For these reasons the wire is tougher and will stand more bending and twisting, giving it an added value for manufacture into wire goods of all forms and shapes.

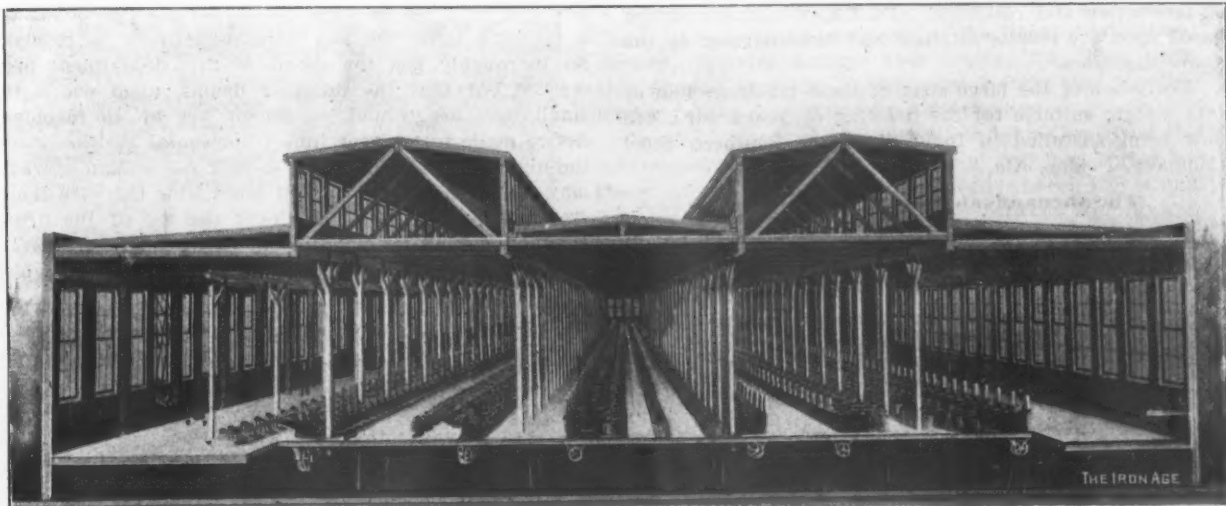


Fig. 5.—Arrangement of the Shenandoah Steel Wire Company's Main Wire Room, Showing the Motors Under the Floor.

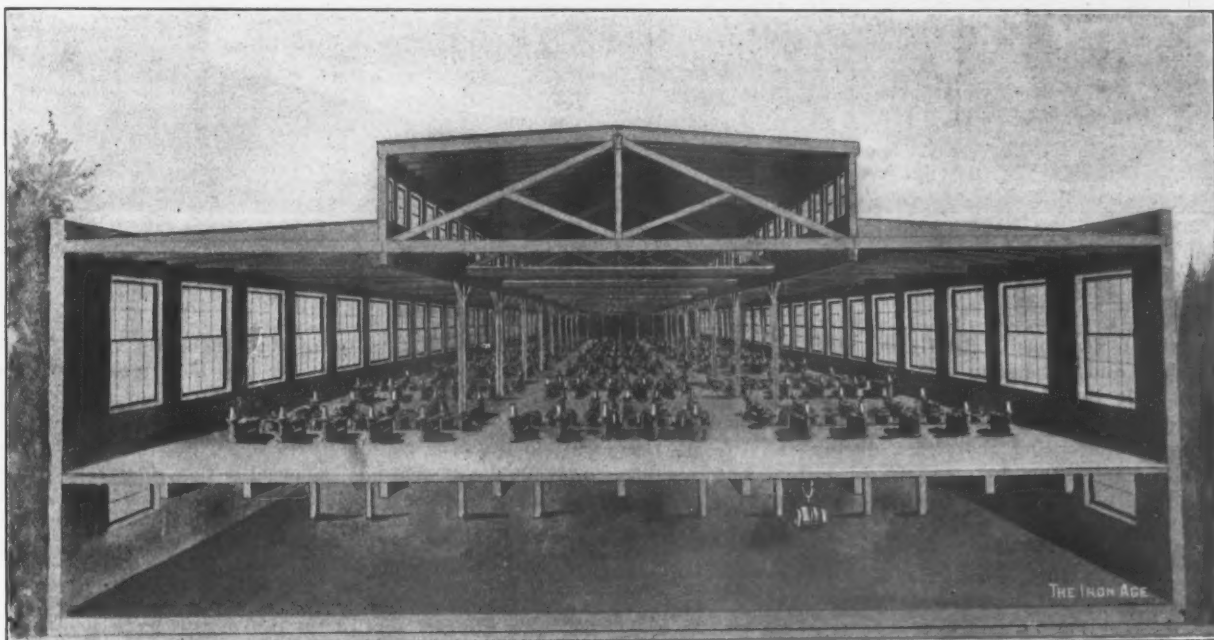


Fig. 6.—Arrangement of the Shenandoah Steel Wire Company's Fine Wire Room.

We realized the crude and imperfect state of the art, also that if the dies could be made mechanically they would be all alike, less costly to produce, and would eliminate skilled labor from a mill using our multiple die machinery, as far as drawing the wire was concerned. We made a thorough study of this phase of the question and eventually produced machinery which would compress or upset the metal of the die, thereby reducing the hole in the die, punching the hole to the exact taper and depth and perfectly round, the punch, turning while so doing, also burnishing and making smooth the eye of the die. We then combined all these functions in one and the result is a machine that will remake a die in one operation with an operator having no previous knowledge or skill in the making of dies, at a cost which

The finish is beautiful; coils of wire drawn by the multiple die system through the special liquor previously mentioned when placed with coils of similar size drawn by the single die system can be easily recognized by their superior appearance.

The multiple die system and the remaking or resizing of dies by machinery, as previously described and exclusively represented by these inventions, is not limited to any particular class of wire or to any particular degree of hardness, being equally adapted to high or low carbon and patented wires.

Twenty patents covering these inventions have been issued by the United States and 25 by foreign countries. These patents are for process, material and mechanical, several being basic or master patents.

The conservative management of the company did not rush hastily before the world with an announcement of its success, but, recognizing that machinery of a new type often aroused enthusiastic dreams which later were not realized, decided to sell a limited number to wire manufacturers where they would be operated under regular mill conditions. Fourteen machines were sold to a Canadian manufacturer, 14 to one wire manufacturer in the United States, 36 to another, and later 14 were placed in London, England. All of these have been operated continuously as a regular part of the manufacturers' mill equipment, and most of them run double turn, or day and night. Fig. 3 shows 36 of these machines of one size running in one mill. The earlier machines placed, which of course are not of latest design, have been in operation for two years. The great saving shown in cost of production and collateral advantages enumerated are based upon the results attained and demonstrated by the above machines.

Forty-two of the large sizes of these machines and of late design, suitable for the drawing of heavy wire, are now being installed in the mill of the Southern Steel Company, Ensley, Ala.

The Shenandoah Steel Wire Company.

It was determined as a policy of the company not to look for the return of investment and future profit from

finally to the shipping room by electrically driven trolleys and conveyors. This has never been possible with machinery using the single die system, and is only practicable where machinery of the multiple die type is used, which, because of its peculiar construction, lends itself to these conditions and to the adoption of the best modern American methods of division of labor. Skilled labor is almost entirely abolished. Only five men in the new mill will have had any previous knowledge of wire, or the wire business, out of a full force when the wheels begin to turn early in the present year.

Women Will Draw Fine Wires.

All wire finer than No. 21½ will be drawn by women, a condition not possible with machines of the single die type. Of the tons which will be produced daily no necessity will exist for an employee to lift a single pound off a machine until the fine wire department is reached. So thoroughly has the detail of this department been worked out that the finishing drums, upon which the small coils are wound, as drawn, are by an ingenious device made to tip over into a horizontal position about the height of a common table, so that the woman operator may conveniently and without labor slide the wire therefrom, not lifting it up and over the top of the drum. Further, during the handling at each of the 19 separate operations there is a certain amount of waste, which

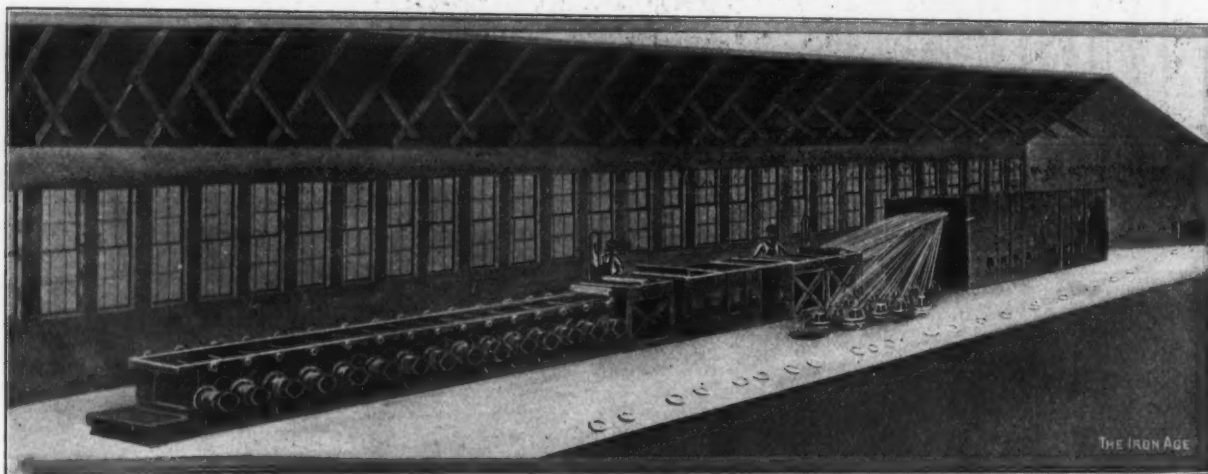


Fig. 7.—Galvanizing Room of the Shenandoah Steel Wire Company.—The Finished Wire in Coils Is Placed on a Conveyor Shown in the Foreground.

the sale of machines in the United States, but to sell the machines and patents in and for foreign countries and erect mills in the United States, whose owners would have exclusive use of the machines and enjoyment of the advantages accruing therefrom during the life of the patents. With this in view the inventions and results secured in practice were brought to the attention of capitalists who became interested, and a company was formed known as the Shenandoah Steel Wire Company, and the first unit of a modern mill is now under construction at Buffalo, N. Y.

The mill buildings are of one to three stories and constructed of concrete blocks. A part of the equipment will be 302 multiple die machines. No old style single die machines will be used. These machines will be driven by Westinghouse electric motors. The power and lighting systems will be electric, furnished by the Niagara, Lockport & Ontario Power Company, Niagara Falls, steam being used for heating purposes only. The buildings and equipment will be of the most substantial character, no expense being spared to secure a mechanical equipment that will attain the highest economies in cost of production. The main departments will be arranged as shown in Figs. 4 to 7.

The mill will be unique, as by the use of conveyors, overhead trolleys and other labor saving devices the old-fashioned method of trucking wire around a mill has been practically abolished. The lifting is done by electric cranes. The wire, while in process of manufacture and as finished product, is carried between departments and

places manufacturers using the single die system at a disadvantage as 19 is to 3. In addition, 19 opportunities are presented to the operator to sidetrack or temporarily set aside wire which for various reasons he may find difficult to draw as against three opportunities only by the multiple die system. In some mills this sidetracked wire amounts to many tons, and every ton so held in process of manufacture represents a noninterest bearing investment and a resource not active in the cash working capital.

Another unique feature which may be of interest is that in no department of the mill will it be necessary for the operators engaged in their daily duties to wear old clothes, oilcloth aprons and hip rubber boots. The machines lend themselves to such cleanly methods, so free from sloppy water and liquors that the most refined lady could visit the mill on a tour of inspection and not get the hem of her garment wet or soiled. If the reader will but look at the floor of the room containing the 36 machines, shown in Fig. 3, he will see that the sensitive lens of the photographer fully attests this statement. Clean manufacturing methods attract intelligent employees and make clean operators, who turn out high grade products.

Comparisons of Costs.

Added to the collateral advantages above enumerated is the cheaper cost of production. The cost of drawing 600 lb. of steel wire from No. 5 rod to No. 14 wire by the two systems is as follows:

The single die system would make 16 drafts (being

limited to a 150-lb. coil) using 16 different reels, 16 different dies, 16 different drums, lifting by hand and transferring it 16 different times. Allow for pointing and threading the dies and transfer handlings 1 min. each, or 16 min., the drums being of 22-in. diameter, speed 72 rev. per min. The old system will draw the wire through 16 dies in 200 min.; add the 16 min. above for pointing, threading, reeling and handling, gives a total of 216 min. The machines of the multiple die system handle 600-lb. coils, which are pointed and started at one end and threaded through five dies in 3 min. Allow 1 min. for tying up at the other end of the machine, while on the drum (which is impossible in the single die system), and to be dropped by the conveyor. The finishing drum, 22 in. in diameter, running at a speed of 130 rev. per min., will pass the entire coil through in 48 min. Add the 4 min. above and we have a total of 52 min. against 3 hr. and 36 min. Reducing this to pounds, one man will produce with single die machines 9600 lb. in 24 hr. One man with multiple die machines will produce 60,000 lb., a difference in favor of the multiple die machine, on coarse wire, run by one human unit for 24 hr., of 25 1-5 tons. Both results above named are based on actual, not theoretical, productions.

With the single die system, as previously shown, skilled labor is necessary. With the multiple die system unskilled labor is used. The cost by the single die system is \$1.75 and by the multiple die system 12 cents per ton. The wages of the skilled operator are 35 cents and of the unskilled 15 cents per hour.

With the multiple die system the 600-lb. coils are put on the reels by one man who feeds a large number of machines. This adds 2 cents per ton to the above figure, making the net cost for the multiple die system 14 cents per ton. The net advantage is \$1.61 per ton.

The reader should remember that all wire made smaller than No. 14 must first be drawn to that gauge before the succeeding reductions can be made, but the advantage stated does not fully set forth the value of the invention. Where smaller wires are produced, say No. 33½, to the above \$1.61 per ton must be added a constantly increasing saving through successive reductions. As the wire becomes finer the saving is greater, each being added to the first until by the multiple die machines the finer sizes of wire can be produced for \$60 per ton less than by the present or single die system.

In view of the above showing it is not surprising that the company owning the patents covering these inventions confidently believes that all steel wire used in the world will be ultimately drawn by the multiple die system. The single die system cannot produce as much wire with one die at a time and of equal quality as can be produced by the multiple die system through many dies at a time in one operation at the same cost per ton.

Nothing has been described above that the reader may not find fully set forth in the patent papers. The company has no stock to sell, because all that both companies in interest had to offer was disposed of, and when all was gone there were seekers for more. It further has no machines to sell. It does not by this announcement mean to say that it is unwilling to enter into friendly association with other manufacturers who may be so disposed. It is the company's purpose to sell wire, the product of the multiple die machines. *The Iron Age* believed the story of the invention would be of general interest and worth telling, and it has been our pleasure to comply with its request.

Steam Turbine Performance.—Tests of Elektra steam turbines have recently been reported from Switzerland. One of the machines was a 45-hp. single stage turbine running at 3500 rev. per min., and the other was a 60-hp. compound turbine running at 3000 rev. per min. The former was belted to a direct current dynamo and the latter direct connected to a three-phase generator. The output of the latter was measured by a wattmeter placed between two phases. The steam consumption was measured at various loads and at no load, the efficiency of the electrical machines being calculated from a consideration of the various separate losses. For the single stage tur-

bine the most favorable steam consumption at 150 lb. absolute, 286 degrees C. of superheat, 24 in. vacuum and 56 b.h.p. was 26.4 lb. of steam per unit per hour. With the compound turbine operating at 147 lb. absolute, 238 degrees superheat and 26 in. vacuum, the consumption was 19.8 lb. of steam per brake horsepower hour. These figures are not strictly comparable, owing to the decided influence upon the economy of a difference in vacuum between 24 and 26 in. This form of turbine is said to be very compact, the floor space occupied by that of 60 hp. being only 44 by 52 in., with a height of 60 in.

British Suction Gas Producer Tests.

A report has just been published on the series of trials of suction gas producers conducted at Derby, Eng., in June, 1906, under the auspices of the Royal Agricultural Society. Twelve makers sent engines for these tests. The London *Engineer* reviews the results, and the following details are taken from its article:

In the 11 plants of which complete figures are given, the consumption per brake horsepower at full load varied between 1.04 lb. and 1.48 lb.; at half load between 1.38 lb. and 1.98 lb., and at full load with coke between 1.21 lb. and 1.65 lb. The smallness of the consumption of fuel for plants of such limited size—the largest developing little more than 20 hp.—is noted. While between the best plant and the worst the difference is less than ½ lb. of coal, the better plants differ by but 0.05 lb. on the half power trial, the difference between the best plant and the worst, which were not the same engines as in the full power tests, was 0.60 lb., and that between the three best only 0.11 lb. Turning to the coke trials, the same figures are 0.44 lb. and 0.12 lb. While, then, it will be admitted that, for scientific purposes, and for the purpose of making a definite award, the figures are useful, it must be acknowledged that there is very little difference, as far as economy is concerned, between the better suction gas plants; and a purchaser, in selecting which among the four or five best plants he shall buy, may, for all practical purposes, almost leave the question of economy out of account.

Capital cost will, no doubt, in many instances be the decisive factor. The most expensive plant is priced at £17 10s. per brake horsepower; but as this includes an exceptional engine, it does not afford a correct basis for comparison. The next plant is £13.55 per brake horsepower, which may be taken as the highest. The lowest is £8.82. The winners of the awards priced their plants at almost the same figure, £11.65 and £11.77 per brake horsepower, and this seems to be, from the remaining figures, about the proper price for a trustworthy plant. Two plants, however, which did excellently in the trials, were entered at £10 per horsepower. No doubt, a considerable discount is allowed on these figures.

A fact which has been too generally neglected in suction gas trials is the consumption of water, and we are glad to find definite figures in the present report. Taking the full power, that with anthracite, it appears that one engine received only ¾ gal. per brake horsepower, while another took as much as 3.61 gal. These appear to be extremes, but there is, nevertheless, a very marked difference in the water consumption of the two best plants, one consuming 1.14 gal. and the other 2.45 gal. per brake horsepower. While it is certain that in many cases the consumption of water is not a matter of much importance, in others it is an item of some weight, and it is a little startling to find that a gas engine requires about as much water to run it as a steam engine. The question of water economy is clearly one that will stand further investigation. The fact that the plant to which the highest award was given consumed considerably less than half the water required by the plant receiving the second award shows that there is considerable scope for improvement in this direction. It may be noticed also that a plant consuming only 1.09 lb. of fuel per brake horsepower took the least water, 0.98 gal. In view of the fact that a portable suction producer plant is required, the importance of improvements in the scrubber, which will reduce the water consumption, is manifest.

The New Castle Forge & Bolt Company.

One of the largest and most modern plants in the country for the manufacture of car and drop forgings, nuts, bolts, washers, chain and similar lines of product is that of the New Castle Forge & Bolt Company, New Castle, Pa. This company was organized January 1, 1902. The original capital was small but was soon increased to \$75,000, and later to \$300,000, the increases being made necessary by the rapid growth of the business, which required additional buildings and much new equipment to take care of it. Operations were begun with a main building 80 x 200 ft., with a monthly capacity of about 200 tons of car forgings and rivets. As the business expanded, new departments were added, comprising washer, chain, bolt and nut departments, and the capacity was increased tenfold, or to 2000 tons per month. The original main building is now 100 x 420 ft. This building is of steel construction and contains the forge and chain shops and one sheet mill.

The forge department includes a complete equipment of hammers of all varieties, styles and sizes; bulldozers, upsetting machines, punches and drill presses. The machinery is all of a heavy type and is particularly adapted to the manufacture of car forgings, pressed steel plates and miscellaneous specialties for railroads. The chain department contains a Riehle chain testing machine of 100,000 lb. capacity and 35 chain fires. This department also runs almost exclusively on chains for railroads and cars. The washer department contains five presses and manufactures washers of all sizes. The sheet mill is a standard 30-in. mill, driven by a 250-hp. engine and rolls a wide variety of plates and sheets. The material in the forge and chain departments and the mill is handled by a system of narrow gauge tracks and cars.

The bolt and rivet department is contained in a steel and brick building, 80 x 400 ft., and commanded by a 5-ton Alliance electric traveling crane. This department contains a full equipment of Pawtucket and Lewis & Chaplin headers for bolts, and Acme machines for rivets, track bolts and carriage bolts; also nut machines of different types, together with automatic tapping and threading machines.

The entire plant is operated by electricity. Westinghouse generators directly connected to Erie City engines furnishing the motive power. The building containing the forge and chain shops and sheet mill and the building containing the bolt and rivet departments are built on each side of the storage yard, which is traversed by a 15-ton crane, used for the loading of raw material.

The boiler house has two batteries of Erie City boilers of 700 hp. capacity equipped with Swindell grates. All the water used in the works is sand filtered and is furnished from the company's own well.

The gas producer plant recently added to the works by the American Furnace & Machine Company, Pittsburgh, contains five gas producers and 21 furnaces, with underground gas connecting sewers and waste heat flues. Ten of these furnaces are of the Swindell improved regenerative type, for making a welding heat; 10 of them are of the Swindell system recuperative furnaces for producing a shaping heat, and one is a sheet furnace of the recuperative type. The sheet furnace is to heat bars for rolling into sheets. The furnaces were all designed by J. D. Swindell of the American Furnace & Machine Company, and those of the regenerative type are equipped with the J. D. Swindell patent water sealed gas and air valve. They are all run in connection with air blast.

The greater part of the plant of this company, including the forge, chain and washer department, the boiler house and the engine room, was entirely destroyed by fire in August, 1905, but it was quickly rebuilt and in fact was shut down only four weeks before resuming operations. The shipping facilities are superior, the plant having direct switching connections with five of the leading railroads. A large warehouse has recently been added, and assorted stocks of all finished material are carried, to facilitate the prompt and complete shipment of orders. The success of the company warrants further extensions, and it is contemplating at this time certain

improvements, which will almost double the present capacity. C. J. Kirk is president; E. E. Whittaker, treasurer, and J. F. Donahue, secretary and manager of sales.

Pennsylvania as a Leader in Industry.

In the current issue of the *Bulletin* of the American Iron and Steel Association General Manager James M. Swank has a comprehensive article on "The Great Industries of Pennsylvania," from which we take the following:

It is an old story that Pennsylvania has long been noted as the leader of all the States in the mining of coal, the manufacture of coke and the production of iron and steel. Its leadership in these great industries in 1905 was well maintained, as will be seen by the following table, which gives its percentage of the total production of coal and coke and of various leading forms of iron and steel in the whole country in that year of general industrial activity:

Coke in net tons; all others in gross tons.	United States.	Pennsylvania.	Penna's percentage.
Coal, all kinds.....	350,820,840	175,065,613	49.9
Coke	32,231,129	20,573,736	63.8
Iron ore.....	42,526,133	808,717	1.9
Pig iron.....	22,992,380	10,579,127	46.0
Steel, all kinds.....	20,023,947	11,040,423	55.1
All kinds of rails.....	3,375,920	1,115,841	33.0
All other rolled iron and steel	13,464,086	7,802,440	57.9

Contrary to common belief, Pennsylvania has not been a large producer of iron ore since the rich ores of the Lake Superior region came into general use in the manufacture of Bessemer pig iron about 1880. Its small production in 1905 is included in the table. And yet Pennsylvania was first of all the States in the mining of iron ore for more than a century down to and including the census year 1880. In 1889 it fell to the third place and in 1905 it occupied the sixth place among the iron ore producing States, having advanced in that year from the ninth place in 1904. Its production of iron ore in 1905 was 808,717 tons, but in 1904 it was only 397,107 tons. In 1904 its percentage of the total production was 1.4 and in 1905 it was 1.9. It is not necessary to comment on the prominence of Pennsylvania as a producer of iron and steel except to call attention to its extraordinary percentages of the total production in 1905, as they are shown in the table. . . . To sum up important particulars: Pennsylvania is to-day first of all the States in the production of iron and steel and of coal and coke and probably first of all in the manufacture of silk. In the census year 1900 it was second in the manufacture of woollen products and second in the total value of all textile products, fourth in the production of lumber and all kinds of paper, and second in the production of chemicals. It has long been first in the production of leather and first in the manufacture of glass. It has lost its early leadership in the production of petroleum, but it is first in the production of natural gas. It is first in the production of Portland cement and in the manufacture of fire brick and tiles, but is third in the manufacture of pottery. It leads all the States in the manufacture of locomotives, railroad cars and saws, and it is the only State that makes armor plate. As an agricultural State it is excelled by other States in the aggregate value of farm products, but in many of these products it is either first or closely follows other States. It leads all the States in the production of roofing slate and limestone.

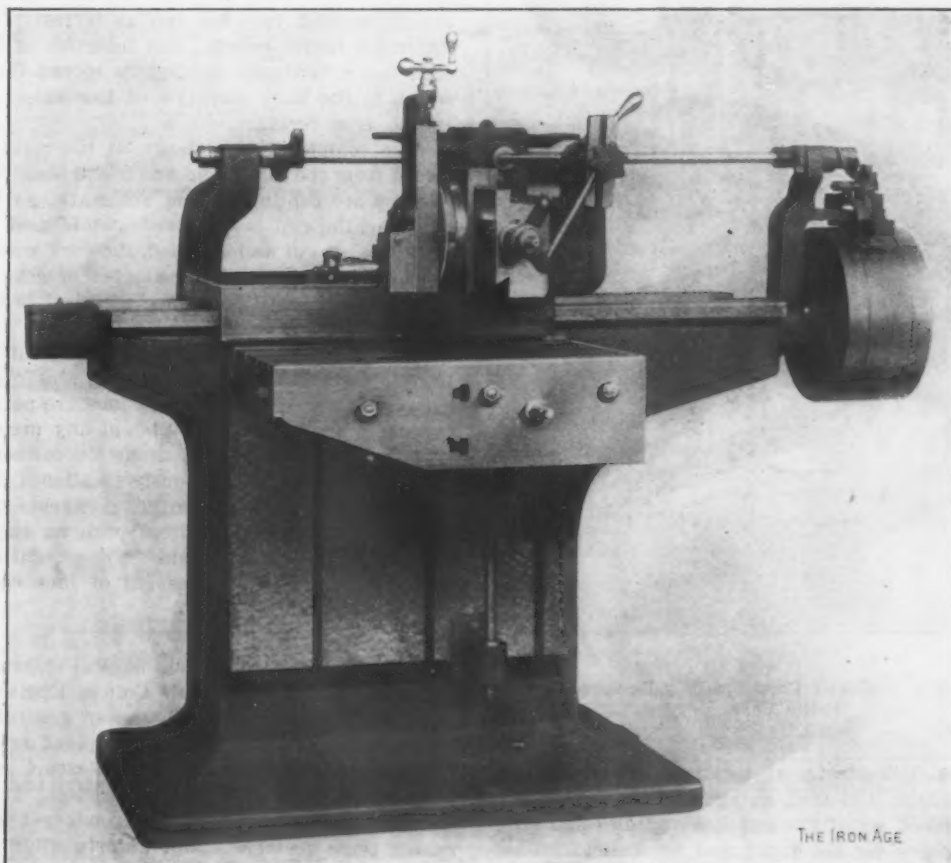
Pennsylvania produces none of the precious metals. It is a small producer of zinc, which is found a few miles from Bethlehem. Lead was at one time produced at a mine near Phoenixville and smelted in the neighborhood. Copper also has been found and smelted in the vicinity of Phoenixville. Neither lead nor copper is now mined in Pennsylvania. In Lancaster County is the only nickel mine in the United States that has been profitably worked. Pennsylvania is now a small producer of salt, but in the early part of the nineteenth century it was first of all the States in the manufacture of this necessary of life.

The Cincinnati Open Side Shaper.

An extension to the lines of pillar and traverse shapers built by the Cincinnati Shaper Company, Cincinnati, Ohio, is a line of open side shapers, or planers, which are better adapted to certain classes of work than either a pillar shaper or a traverse shaper or an ordinary planer. These shapers are in general principle similar to the familiar Richards type, with the addition of certain improvements, principal among which is the method of shifting the belts for the reversing table drive. The action of the reversing mechanism may be understood by reference to the illustration. It is effected entirely by a partial rotating of the shifting rod shown at the top of the machine, the rod being automatically turned by cams on the saddle, which resemble in appearance the wings of a bird, coming in contact with adjustable dogs on the rod. The rod may also be rotated by hand by means

be removed to bolt work directly against the side of the table proper, or the table itself may be removed and the pieces bolted direct to the column. The keyseating of shafting of any diameter may be done on the machine. All flat bearings are hand scraped to surface plates, and all tee slots are cut from the solid. Ample means are provided for oiling. The following are the principal dimensions of the 15 x 30 in. machine, the smallest size made: Length of stroke, 30 in.; width planed, 15 in.; maximum distance head to table, 15½ in.; minimum distance head to table, 4½ in.; vertical adjustment of table, 11 in.; length of table and extension, 30 in.; width of table, 18 in.; depth of table, 12 in.; down movement of tool slide, 6½ in.; ratio of cutting speed to return speed, 1 to 2, and the weight of the machine and countershaft, net, 3450 lb.

Salisbury Iron Mine Improvements.—The shareholders of the Salisbury Steel & Iron Company, Utica, N. Y.,



The 15 x 30 In. Open Side Shaper or Planer Built by the Cincinnati Shaper Company, Cincinnati, Ohio.

of the lever shown just back of the star wheel which controls the throw of the feeding ratchet.

The tool head is driven by a single screw and bronze nut, without the use of intervening gears. The screw is 2½ in. in diameter, and is made of 0.5 carbon steel. The saddle has a long and wide bearing on the bed, with a narrow and deep guiding surface to prevent the binding so likely to occur when the tool is at the outer end of the rail. The saddle is provided with a taper gib, adjustable lengthwise by screws at each end, to afford uniform contact on both sides of the gib.

The cross feed of the tool is effected either by power or by hand, and is positive and adjustable. The down feed is by hand only. The cross feed is actuated simultaneously with the reversing of the driving pulley by the turning of the shifting rod. This rod has ball bearings, and there are also ball bearings under the elevating screw to the table. Taper gibs are provided for the cross rail and head. The head has a down feed of 6½ in., swivels, is graduated and has a micrometer collar reading to 0.001 in.

A crank handle may be used for the rapid raising and lowering of the table, and the supplementary table may

have authorized the issuance of \$250,000 in 10-year bonds to provide for building a standard gauge railroad from Dolgeville, N. Y., to the company's magnetic iron mines, on the Salisbury Range, Herkimer County, N. Y., and also to erect a modern 500-ton concentrating plant for handling the milling ore. The railroad will be about five miles long, and the contract has been awarded to the Jackson-McKernan Construction Company, New York, which is now pushing the work. The new concentrating mill will be electrically equipped throughout and will be constructed by the Traylor Engineering Company of New York City. It is expected that the concentrating plant and the railroad will both be in operation by June 1, 1907.

The results have been published of tests of automatic couplers submitted to a commission of Russian railroads in response to an offer of prizes in an international competition for the best automatic coupling device for railroad cars. Not a single coupler has been considered to meet the conditions laid down in the competition. No first or second prize was given, but a third prize was awarded to L. Boireau.

The V. & O. Automatic Bottle Cap Machine.

Machines for the manufacture of metallic bottle caps are of an especially timely interest, as the practice has become prevalent to seal nearly all bottled goods of a perishable nature with metal caps rather than the ordinary cork

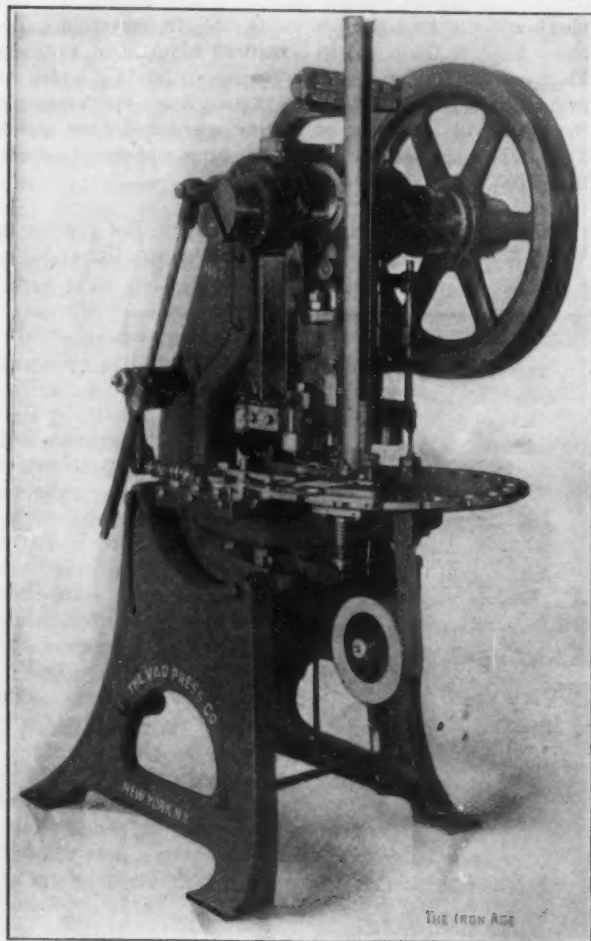


Fig. 1.—A V. & O. Incluable Press Specially Equipped to Make Bottle Caps.

stoppers. Fig. 1 illustrates an inclinable press, equipped with an automatic dial feed, an automatic safety stop, a specially designed set of five punches and dies and other automatic devices for the rapid and economical production of bottle caps complete with wax paper and cork

trema left in Fig. 2, made in a plain press with a combination die, is placed by the operator into one of the holes in the revolving dial, which moves it into position for the first operation of the series. The punch embosses lugs in the legs which serve to lock the cap on the bottle neck. During the up stroke of the press slide the dial is advanced one step and the blank placed in position for the second operation. At this point the blank is redrawn to the proper depth and the legs bent up at right angles. The cap is now completely formed and ready to receive the wax paper and cork.

A paper strip is automatically fed from a roll across a cutting die placed directly over the holes in the die plate and as the slide descends the third punch of the series cuts from the strip a disk of the form shown at the right of the blank in Fig. 2 and pushes it into the cap as it passes beneath the cutting die. The vertical tube, seen in front of the machine, is loaded with the cork washers, such as shown in the third view in Fig. 2. From this magazine these washers are automatically fed and firmly inserted into the cap as it rests for an instant under the fourth punch. The insertion of the paper and cork has a tendency to slightly spread the locking legs which in the final operation of the series are bent back in the true position.

The completed cap, shown at the right in Fig. 2, is forced from the dial by an automatic positive ejector. All motions are continuous and automatic, so that with one handling the cap is embossed and formed to shape, the waxed paper cut and inserted, the cork washer placed on top of the paper, and the number of caps produced recorded by a counting machine attached to the top of the press.

The machine is capable of running at from seventy to ninety strokes per minute; each stroke producing one complete cap, as the five operations are performed simultaneously on five pieces. Should any accident occur so that the dial is unable to assume the correct position the patented safety stop previously mentioned disengages the clutch and stops the press. The attachment is almost a necessity on a machine fitted with an expensive set of punches and dies, for should the press continue to operate with the dial and punches out of line serious injuries would result.

The results of tests of mechanical stokers are given in a bulletin of the Iowa State College Engineering Experiment Station, dealing with power generation in Iowa. The two things required by steam plant owners and manufacturers, in the use of coal and steam generators, are stated to be economy and smokelessness. Intelligent hand firing is said to be the best agency yet known for securing these desiderata, but unfortunately it is not easy to obtain or to retain thoroughly competent firemen, and

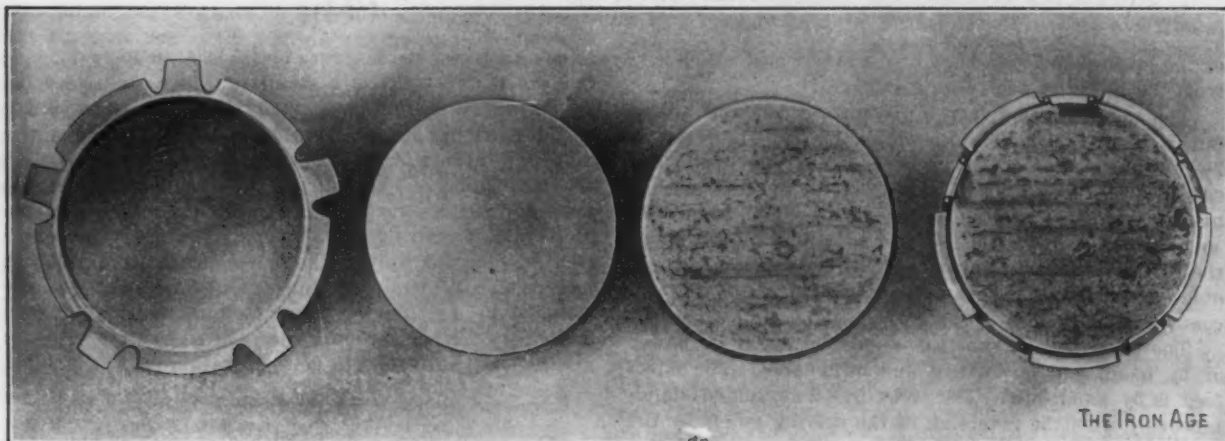


Fig. 2.—Views Showing the Three Parts and a Completed Bottle Cap.

washers inserted, ready for application to bottles. The machine entire was designed and built by the V. & O. Press Company, Glendale, L. I.

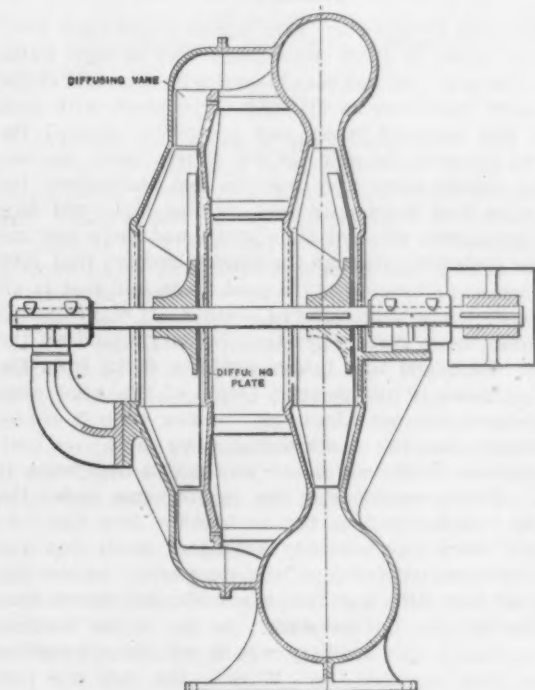
The operation of the machine is simple, and the cap receives but one handling. The blank shown at the ex-

in large plants their cost is prohibitive, when compared with that of the mechanical stoker. As a direct consequence, stokers have been developed in many localities, where they have met the demands of economy, and sometimes of smokelessness.

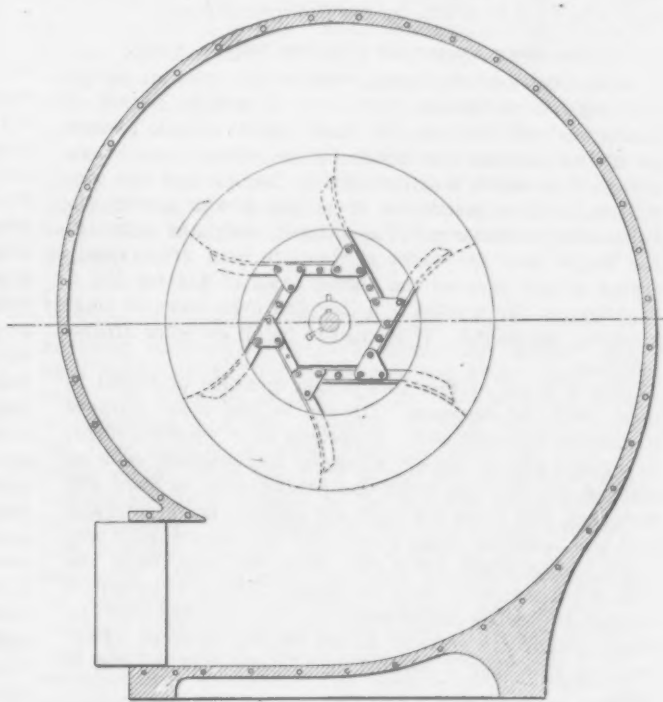
The Buffalo Compound Turbine Blower.

In centrifugal pump design the scheme of compounding two or more stages has been commonly resorted to by manufacturers to obtain a high pressure at a moderate peripheral speed, but the idea has not been applied, in more than an experimental way at least, to centrifugal blowers. The principle whereby a cumulative pressure is effected at the outlet is based on the fact that with a given design of wheel and casing and a given peripheral speed a fan will produce a certain increase in pressure between its inlet and discharge; then with two stages in series, having wheels of the same diameter, the required pressure can be obtained with the fan running at half the speed that would be necessary with a single stage fan.

The blower illustrated follows the line of design common to two-stage pumps, and in construction consists of a cast iron housing or shell in three parts, within which the two blast wheels are hung on a 2½-in. shaft. Each



FRONT ELEVATION



SIDE ELEVATION

THE IRON AGE

A Two-Stage Blower Built by the Buffalo Forge Company.

wheel is built on a hexagonal cast iron hub, to which the spokes or spider carrying the fan blades are riveted. The spider is of 1½ x 1½ x ¼ in. angle iron. The design of the blast wheel is peculiar, in that the blades are curved forward in the direction of rotation at a decided angle, which for any given speed has been found to produce a greater pressure change between the inlet and outlet. The blades taper from center to periphery to constantly accelerate the air by what corresponds to a nozzle effect. The side sheets of the blast wheel are flared at the inlet and are rigidly riveted to the blades.

The air discharged from the blade tips of the first wheel on its way to the inlet of the second wheel passes between diffusing vanes, which are placed at an angle of about 115 degrees with the radius. These vanes prevent loss by eddy currents and shock, and enable the kinetic energy contained in the air due to its velocity to be transformed into potential energy or pressure. The diffusing vanes consist of 20 plates of No. 14 sheet steel, which are cast into a retaining side plate composing the interior side of the first stage. After passing through the second blast wheel the air enters a housing having a cross section, which increases in an arithmetical ratio up to the full area of the discharge, 17¾ in. in diameter.

A peculiar difference between the compound blower and a two-stage pump is allowed by the very much lighter weight of air as compared with liquid. If a two-

stage pump were constructed with the inlets of the two stages both pointed in the same direction along the shaft, a good sized thrust bearing would be needed to withstand the tendency of the shaft to move parallel to its axis. In the blower, however, a collar is found entirely sufficient to withstand the thrust.

This unique blower is being built for the Fanner Mfg. Company, Cleveland, Ohio, by the Buffalo Forge Company, Buffalo, N. Y. It will be belt driven from a 50-hp. motor running at 700 rev. per min. The 16-ounce blast will be utilized in a 64-in. cupola. The machine measures over all 4 ft. 7 in. by 6 ft. 3 in. by 6 ft. 10 in. high.

The 1906 Crop Figures.

The final estimates of the crop reporting board of the Bureau of Statistics of the Department of Agriculture (in which preliminary estimates made earlier in the year are revised and corrected) indicate the acreage and pro-

duction in 1906 of the farm crops of the United States to be as follows:

Crops.	Acreage.	Production. Bushels.
Corn	96,737,581	2,927,416,091
Winter wheat.....	29,599,961	492,888,004
Spring wheat.....	17,705,868	242,372,966
Oats	30,958,768	964,904,522
Barley	6,323,757	178,916,484
Rye	2,001,904	33,374,833
Buckwheat	789,208	14,641,937
Flaxseed	2,505,927	25,576,146
Potatoes	3,013,150	308,038,382
Hay	42,476,224	*57,145,959
Tobacco	796,099	†682,428,530
Rice	575,014	17,854,768

* Tons. † Pounds.

The average weight per bushel is shown by reports received by the bureau to be 56.6 lb. for spring wheat, 59.2 lb. for winter wheat and 32 lb. for oats.

It will be observed that the production of corn was very close to the 3,000,000,000-bushel mark. The 1905 harvest had indicated the high water mark, but the harvest just finished exceeds it by no less than 220,000,000 bushels. The yield of wheat (winter and spring) does not mark a new record, though it exceeds last year's figures by 42,000,000 bushels and is within 13,000,000 bushels of the 1901 figures, which are the high record figures. The barley crop in 1906 established a new record and rye is very close to it.

The Cincinnati Pig Iron Trade in 1906.

BY JAMES A. GREEN.

Prices on January 1, 1906, and toward the end of December show the following great advances:

	F.o.b. Birmingham.		F.o.b. Ohio furnace.	
	January.	December.	January.	December.
No. 1 foundry.....	\$14.50	\$23.50	\$18.00	\$25.00
No. 2 foundry.....	14.00	23.00	17.50	24.50
No. 3 foundry.....	13.50	22.00	17.00	24.00
No. 4 foundry.....	13.25	20.50	.....	.....
Gray forge.....	13.00	20.00	16.50	22.50

This table shows at a glance the tremendous change in quotations between the beginning and the close of the year. But these figures do not show the extreme range in prices, for about the middle of the year they were considerably lower than in January, as No. 2 foundry sold in Birmingham at \$12.75 and at Ohio furnace as low as \$15.50. Now that everything is so strenuous and the whole market has been at a great altitude for so long it is hard to realize that there was a time in the year when pig iron was on the downward path.

The Only Period of Distrust in the Year.

Along in the late spring and early summer, before the crops were certain, there was a definite period of hesitation and distrust. At that time it almost seemed as if the market was going to the eternal bow-wows, and as if a smash was inevitable. No one had any confidence in the situation, or if he had it was a very unsubstantial confidence. The largest merchant seller in the South saw its stocks accumulate, and after vainly trying to sell iron on the ruling basis of \$14 for No. 2 foundry cut the market a dollar and even more to start a buying movement. It seemed to be an evidence of desperation.

For a week or two this heroic measure appeared to meet with no response. Of course the other furnace companies followed suit. It seemed as if we were about to witness one of the old struggles for business, such as marked the nineties, when competition was so keen and merciless, and when the fight for tonnage meant literally that prices cut no figure at all—all that was wanted was orders. But while for a few days this was really the case, yet it was only for a few days. Then the consumers seemed to realize simultaneously that it was now or never, and orders actually rained on the furnaces. They came so fast that it seemed as if there was no end to them.

That was early in July, and at that time began the longest and best sustained buying movement the pig iron trade in America has ever known. From then until now it has never halted for a moment. There has been a continuous demand. At first the buying was for only a few months ahead; then for the balance of the year; then for the first quarter of 1907; then for the first half, and latterly it has been for the second quarter and last half. The stocks on hand in furnace yards were soon exhausted, and since September spot iron has been at a great premium, and the demand for quick shipment has regularly been far in excess of the supply.

The Domestic Supply Unequal to the Demand.

As in 1902, when the boom ran ahead of the resources of the country, foreign iron furnishes some relief, but not in the same wholesale way as then. In that year prices abroad were low, for there were hard times in England and on the Continent. But now the European countries are prosperous. Prices abroad are high, and it is not possible to import iron and sell it at much of a profit, even with the high prices prevailing here. In 1902 import iron was without any doubt the main factor in breaking the American market, but this time the foreign iron has had no appreciable effect. It has been a mere drop in the bucket, so to speak. Then the entire country was flooded with foreign iron, but this year it has not been distributed generally. It has gone to a few users on the Atlantic seaboard, and it has gone to a few other large consumers who do an export trade,

and who in this way will be able to obtain a rebate of the duty.

To-day the furnaces of the country are in a more fortunate condition than ever before in the history of the trade. They have had six months of not only good but high prices, and they are about to enter the new year with their order books filled further than they have ever been filled, and at prices which are tremendously profitable, to say the least. It seems as if nothing could happen to disturb in any way the first half of next year, and there are many who anticipate that 1907 will be continuously good from start to finish.

In this connection it may be interesting to read some contemporaneous notes which were jotted down in this way month by month, and which faithfully reflect market conditions and the feeling of the trade at the times they were written:

January.

Never did a year open with higher hopes than 1906. The iron trade in every department was at high water mark. The year 1905 had been blessed with abundant crops, with great confidence in all lines of business, with high wages and satisfied labor, and prosperity covered the land, as the psalmist said, as the waters cover the sea. For six months many iron concerns, and particularly the steel mills, had practically been running night and day, order books were filled at high prices, and there was not a single dissenting voice in the general opinion that 1906 would see a continuance of the good times, and that in all probability it would be a record breaker. It was expected by a great many furnacemen that January would set the ball to rolling and that things would be doing from the very beginning of the month. Hopes of this kind were disappointed because absolutely nothing of any consequence happened, the month sailing along on an even keel, going neither faster nor slower at the end than when it began. The transactions of the month came under the head of "scattering," as far as foundry iron was concerned. There was a steady buying of small lots and 50,000 or 60,000 tons of pipe iron were sold. As the furnaces had very little iron free to sell the new orders were sufficient to take up the slack. As far as the weather was concerned, this January was more like a beautiful October than anything else. Work in the open was possible everywhere and shipments of iron and coke went forward at a tremendous rate. The coke market, in fact, actually went to pieces. The railroads handled coke as promptly and effectively as though the month were July. So, instead of a shortage, there was really a surplus of coke, and prices naturally answered to the law of supply and demand—that is all.

February.

This month was a disappointment. It was expected that the active buying hoped for in January would surely materialize. But nothing of the kind happened. There was more or less buying, but it was mainly of small lots for quick shipment. There was a good demand for high grade foundry iron for prompt delivery and there was no trouble in placing that, but the large buying for the second and third quarters of the year that was so ardently wished for by sellers was wanting. Prices started to thaw and there were little concessions here and there, not amounting to much, but ominous in their significance. Fortunately, the weather was ideal. Outdoor operations were possible most of the time and the railroads were not in any way distressed. The coke ovens continued to run in a way wholly unusual in winter, and coke prices, owing to the large available supply, were almost on a summer basis.

March.

The month was thoroughly discouraging from first to last. All the expectations that buyers would simply have to purchase or shut down proved to be fallacious,

for, though consumers kept on running, they bought nothing except in a retail way. The large companies in the South had continued to hold No. 2 foundry on the basis of \$14.50, but they gradually came down to \$14, while there were sales on the part of week-kneed furnacemen at \$13.50. But \$13.50 iron produced no enthusiasm. For No. 2 Ohio foundry \$17.50 had been the ruling price, but in actual transactions this price was shaded at least \$1, while there were reports that in some cases even \$16 had been made. Consumers began to draw a deadly parallel between 1906 and 1905, and to predict that this year prices would keep on dropping and dropping until possibly \$11 or \$12 at Birmingham would represent the quotation at which the market would actually waken up. The weather was wretched, winter apparently trying to average up in March for all the balmy days that had made January and February so exceptionally pleasant. The entire trade this month was kept in a state of uncertainty and agitation, because of an expected coal strike. The coal miners and operators met in Indianapolis, and day after day it was announced that there would be a strike or there would not be a strike, so that no one was exactly sure what was going to happen. It made the coal and coke trade good, however, as nearly every one made an effort to get in a stock of fuel, so as to avoid inconvenience in case the threatened strike really materialized.

April.

This month was merely a repetition of last. The long expected buying movement failed to develop. Most of the furnaces in the Birmingham district held at \$14 the entire month, while a few of the independents in Tennessee were offering at \$13.75 and even \$13.50. Foundrymen and ironworkers generally throughout the country were very busy; in fact, there never had been a time when so much pig iron was being used. In spite of this, buying of foundry grades was limited, and sales were made up almost entirely of small lots for prompt shipment. Steel making irons were most in demand, and the scarcity of Bessemer and the active inquiry and the numerous sales of basic were the month's salvation. Virginia furnaces that had been holding their basic at \$15.50 were taken care of well into the fall, and raised their price to \$16. Ohio irons settled down to a \$16 basis, but very little was sold, even at that price. The coke situation was a peculiar one. In the Connellsville districts not more than two-thirds of the ovens were making coke, and in the New River region not more than one-half. It seemed an absolute impossibility to secure labor.

May.

The situation this month had not had a parallel for many years. With every reason why buyers should show a keen interest, they apparently cared not a straw about anything. We made a thorough personal canvass of the South and never had we seen the furnace yards as bare. Iron was being produced in great quantities, but was being shipped out as fast as it came from the cast house. Nothing worth mentioning except some gray forge and mottled was on hand, and the furnaces were falling steadily behind on shipments of higher grade iron. Consumers continued to telephone and telegraph for iron due and many were asking the furnaces to anticipate shipments. Comparatively few were covered for the third quarter, and only an extremely small percentage for the last quarter. On top of all this several of the large Birmingham furnaces had to go out for repairs. With these facts staring them in the face it was natural to think that melters would at least "sit up and take notice," but they did not. Several expressed their willingness to buy when they could get prices to suit them, and one even went so far as to send out inquiries for 20,000 tons. When the day set for his purchase came, however, and he saw how determined the furnace people were to maintain their schedule prices he weakened and called the whole deal off. Yet in spite of this lack of encouragement furnacemen managed to keep their prices remarkably firm. While a few of the small makers took on some business at as low a figure as \$13.50, Birmingham, the standard Birmingham furnaces were holding out for

\$14. The coke trade was listless, buyers holding off expecting lower prices.

June.

The beginning of this month brought no brilliant prospects. It had begun to look as though, with the exception of Bessemer and basic, iron would never again be bought in large quantities. Generally speaking, the important Southern ironmasters held firmly for the schedule price of \$14, while Northern iron dragged along at \$16, with some offering at \$15.75, Iron-ton. Suddenly, without any warning whatever, on the morning of June 20, it was generally announced by the press that the International Harvester Company had bought 10,000 tons of standard Alabama iron on the basis of \$13, Birmingham, for No. 2 foundry. This report was immediately confirmed, and all sorts of theories and conjectures were offered regarding the break. The market tottered, but almost instantly regained its equilibrium. The crisis had passed. Apparently nothing better could have happened. These events had acted like a tonic on the situation. Southern prices readjusted themselves to a \$13.50 basis, which put Northern and Southern on a parity in many places. This produced an activity in Ohio irons, and the situation in this district strengthened until many of the furnaces had sold up their output through the third quarter, and prices were advanced to \$16.50, Iron-ton, for No. 2 foundry. In the meantime, buyers of Southern metal, feeling that prices were more nearly normal, continued to buy in satisfactory quantities. Very little coke was bought in the month of June, owing to the fact that liberal shipment was being made of material that had previously been delayed on account of the strike.

July.

There was no indication when the month opened of anything unusual about to happen. The market had been fairly active, but trade was not along wholesale lines. As a matter of fact, iron in the South had been accumulating, and the prospects in that section were far from promising. The Northern furnaces were in better shape. They had been selling fair quantities, and had decent orders booked on the basis of about \$16 for No. 2 foundry. The troubles in the South came from the fact that they had been holding at \$14 for No. 2, which, bearing in mind the great difference between the freights the Alabama and the Northern furnaces have to pay to points of consumption, gave the latter a decided advantage. But almost in the twinkling of an eye the whole situation was changed. The largest of the Southern producers announced a reduction in prices of \$1 to \$1.25. The other Southern furnaces followed suit, and consumers came rushing into the markets in crowds. One Alabama concern alone sold upward of 250,000 tons, and the others all received their share. A great part of this tonnage was booked between \$12.75 and \$13.50 for No. 2. In less than a fortnight the market, both North and South, was literally cleaned out of spot iron and of iron for the third quarter. Many of the furnaces withdrew all quotations, and held the balances they still had unsold for the last quarter. Such was the general confidence in the situation that by the end of the month there were many inquiries for 1907 delivery. When August 1 came, Northern iron was firm at \$17, and Southern at \$14 for No. 2, and there was a general feeling that prices were destined to go still higher.

August.

After July it seemed as if there would be a breathing space in August. It was a beautiful month, with none of the heated spells which occasionally paralyze business. But even if it had been hot it would have made no difference, for the buying movement had obtained such momentum that nothing could stop it. Southern No. 2 went from \$14 on the first of the month to \$15.75 at the end, and Northern from \$17 to \$18. The tonnage booked was very large, but it was odd that the business did not seem to be on a wholesale basis. That is, the individual transactions were mainly small, yet the number of them was enormous. Every one in the iron trade seemed to be buying something. Spot iron was in great demand and

the supply was not half what was needed. Of course the main buying was for shipment over the balance of the year and consumers were subjected to the unexpected and somewhat novel experience of being obliged to go shopping. It was this fact of knocking at the door with an order and finding it refused that made consumers open their eyes. They began to appreciate dimly the fact that consumption had overtaken and passed production, and that if things kept on as they promised there was a likelihood of all kinds of trouble ahead. It began to be apparent that this change in market conditions came because of the fundamental prosperity of the country, which had suddenly enormously increased its business. Then there was another thing that became evident, and that was that the development of the furnaces of the country had been to keep pace with the growing steel trade and that the foundries had increased without a corresponding increase in the number of furnaces making merchant foundry iron.

September.

The first fall month more than carried out its previously well earned reputation for activity in the iron trade, being a strenuous period from start to finish. The greatest feature of the month was the very heavy buying for 1907. At the beginning of the month there was some indication that the excitement was over, but this idea was entirely erroneous. First there came a tremendous inquiry for spot iron. No very big lots were wanted, but there were consumers all over the country in the market for small lots. High grade soft foundry iron was particularly in demand, and this was simply found to be unobtainable. Buyers disappointed in getting iron for immediate shipment took what was offered for the balance of the year, and it was found that there was not any too large a quantity of that. So, naturally and logically, purchasing began for the first quarter of the next year. The buying started at about \$14.50, but within a few days the price was firmly fixed at \$15 for No. 2, Birmingham. What little spot iron was offered was held for about \$1 per ton premium over iron for forward delivery. Sales for delivery over the first quarter of 1907 came in such volume that a number of furnaces refused to quote for delivery over the entire first half. Buyers accepted this amendment without a dissenting voice. The month closed with \$15.50 the general asking price for 1907. Northern iron had been offered quite freely during the month at \$18 for first half delivery, but the recognized quotation by October 1 was \$19.

October.

October was the most active month possible to imagine. It began with wholesale buying for delivery over the first half of the year, but about the middle of the month only a few companies were willing to sell for delivery over the first quarter, and they either withdrew entirely from the market or limited sales to delivery over the second quarter. In view of the tremendous demand prices advanced very sharply. In Birmingham on October 1 iron for the first half of 1907 was \$15, and spot iron was \$16.50. On the last day of the month \$22 was being asked for spot iron. No. 2 was \$18 f.o.b. Ohio furnace on the first day of the month and \$21 on the last day. These prices were not in any way fictitious, but all the iron that was sold, and practically all the iron that was offered, brought these figures. It was very evident as the month progressed that consumers were going to need much more than they had purchased, for consumption was at an unprecedented rate. In practically all districts in the country, but particularly in the South, there was a shortage of labor, and of railroad cars as well. The month ended with a very serious state of affairs, in that the supply of iron was not adequate to the demand, and when this happens business necessarily suffers.

November.

November opened with a continued active demand and prices showed the same upward tendency that had been the case since the middle of July. All the month there was a constant call for spot iron and all kinds of

prices were paid, so that it was impossible to say really what was the market price. Actual sales were made at from \$22 to \$25. This great variation came from the fact that some of the iron had been shipped on consignment and could be delivered instantly, which gave it a much greater value, as compared with iron that had to be shipped from the furnace. The car shortage had been playing a decidedly important part in the situation and assumed alarming proportions, especially in the South. There had been a feeling among consumers for some time that each advance would prove to be the last; that prices could not go any higher. In this, however, they were disappointed, for the end of November found prices at least \$1 per ton higher than the beginning. Quotations on Ohio iron were raised from \$21 to \$22 for shipment over the second quarter, while \$21 at the furnace was asked for delivery over the last half of 1907. Where carload lots of Ohio No. 2 put in an occasional appearance they easily brought \$25 at the furnace. In the South a little iron was to be had for shipment over the first three months, but the furnaces asked from \$2 to \$3 per ton more for first quarter shipment than for second. Consumption was enormous, and everywhere foundries and mills were running full. Weather conditions were ideal for outdoor work the whole month. Several of the most important Southern furnaces, worn by the long strain of continued use, had to blow out for repairs.

December.

December closed with the market firmer and stronger than at any time since the advance began. For six months the market has been steadily climbing upward, and no man to-day can say where is the top. When \$25 iron was first predicted, at the time iron was selling between \$16 and \$17, it seemed an impossible figure. Now there are many men in the market, men very well qualified to form a sound opinion, who prophesy that iron will be \$30 before it is less. The buying movement has been so well sustained that all records have been broken, and one of the wonderful things about it is that it has been a steady, solid and continuous advance. There has been nothing sentimental about it. The market has gone up as gradually and as steadily as the tide rises, and now interest is entirely centered in the future. Every one in the trade is discussing what will be the prices for the last half of next year. It is amazing to think that the situation is such that prices from 6 to 12 months away should be of living and vital importance at the present.

December was a strenuous month from start to finish. Southern No. 2 for spot shipment was \$22 when the month opened and from \$23 to \$24 when it ended. Northern spot iron advanced in the same way. For forward delivery the general advance was about \$1. The great feature of the month was the heavy purchasing for the third quarter or the entire last half of 1907. Never in the history of the trade was there such free buying at top prices for shipment so far ahead. As a result of all this buying fully 90 per cent. of all the iron which the country can make for the first quarter is sold, more than 80 per cent. of the second quarter iron is under contract, and for later delivery a heavy tonnage has been booked. So the furnaces are going into the new year with magnificent order books and from their point of view the outlook is rose colored.

Refuse from a gas works plant in Leeds, England, is used for the manufacture of brick. Lime is there used for the purification of the gas, and the spent lime, formerly wasted, is now put to a good purpose, being mixed with clinker waste and calcined in a kiln at an intense heat for 18 hr. The heat is obtained with producer gas and an abundant air supply in the kiln. After being calcined, the material is spread out on a floor, allowed to gradually cool, and then is thoroughly slaked. After this it is ground and sent to a mixer, where more clinker is added, and the material is then carried to a two mold press which has a capacity of 1000 bricks per hour. The bricks are finally hardened by subjecting for 14 hr. to a steam pressure of 120 lb. per sq. in., after which they are ready for use.

The Little Giant Portable Punch.

For punching holes in ferrules and tank heads and all irregular work which cannot readily be carried to a stationary machine the Excelsior Tool & Machine Company, East St. Louis, Ill., is manufacturing a portable lever punch, styled the Little Giant No. 2. The levers are so compounded that the greatest leverage is brought to bear toward the end of the downward stroke, greatly reducing the power required in operation. If desired it is furnished with a bracket or stand, so constructed

when set for punching lighter material, the adjustment being made by raising the die out of its socket and inserting or removing one or two of the steel washers furnished with each machine for this purpose.

The Chicago Midget Rotary Drill.

A curiosity in point of size, but at the same time a useful tool and not a toy or a model is the Midget pneumatic drill herewith illustrated, and made by the Chicago Pneumatic Tool Company, Chicago. To better indicate its

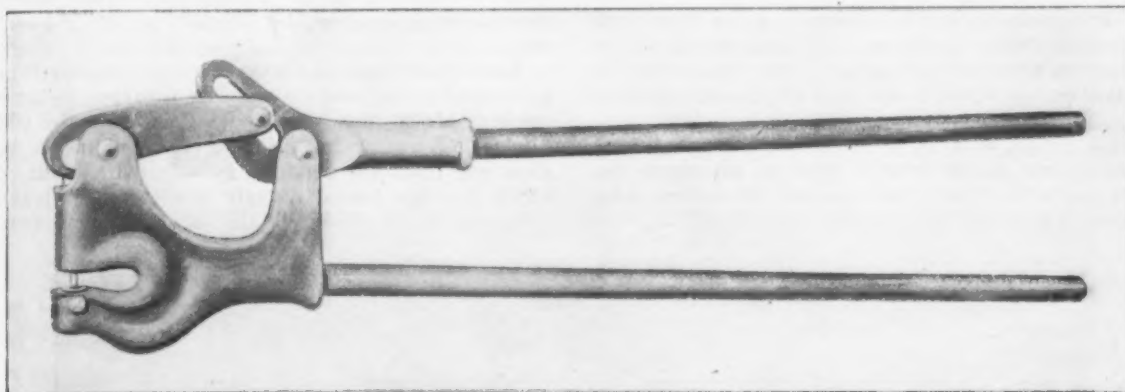


Fig. 1.—The Little Giant No. 2 Portable Lever Punch, Made by the Excelsior Tool & Machine Company, East St. Louis, Ill.

that it can be bolted to a bench or post in any position, the cap being provided with separate bolts which release the punch without loosening the bracket from its fastening.

The punch has a 2-in. throat and a $\frac{1}{2}$ -in. opening and will punch to within $\frac{1}{2}$ in. from the corner of the stock. The handles are removable, as shown in Fig. 1, and when unscrewed the punch can be easily carried in a tool box or satchel, as it weighs only 15 lb. complete. The removable handle feature is also advantageous for quick

diminutiveness it is shown in comparison with a man's hand. A consideration of its dimensions and capabilities makes it even more interesting. It weighs about $2\frac{1}{2}$ lb. The over-all length from the top of the breast plate to the end of the spindle is $7\frac{3}{4}$ in. and the housing is 2 in. in diameter. The air motor runs at a speed of

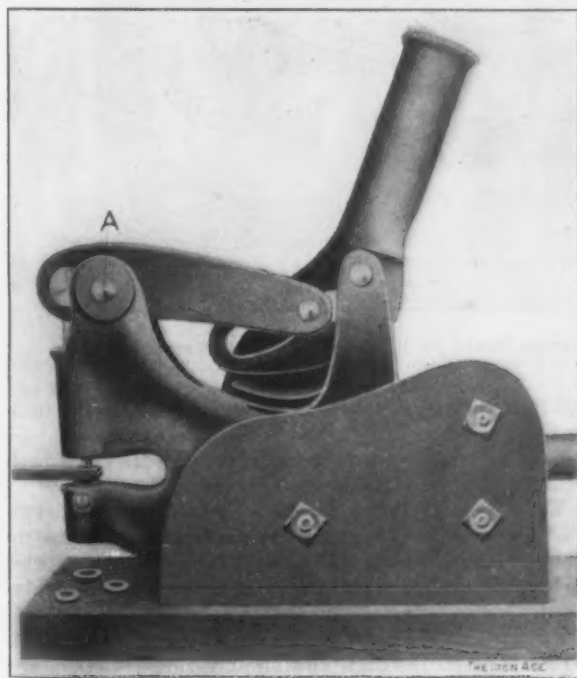


Fig. 2.—Detail of the Punch End in Open Position, Showing Also Manner of Mounting for Stationary Use.

and light work, allowing the use of shorter handles. All parts are made of steel and are interchangeable.

The dies and punches are readily changed by removing the hardened tool steel pin A, Fig. 2, and by raising the lever the punch and die can be removed from the punch head. To secure the best results with the least power it is recommended that the levers occupy the position shown in Fig. 2, wherein they are ready to punch $\frac{1}{4}$ -in. iron. The die is shown in a higher position than



The Midget Air Drill, Made by the Chicago Pneumatic Tool Company.

about 22,000 rev. per min., at which speed the spindle makes 2000 rev. per min. The tool is capable of drilling up to and including 3-16-in. holes in steel. Being of the rotary type it operates at full speed without vibration. It is particularly adapted to the drilling of telltale holes in stay bolts, but is equally useful for general light work where accuracy is required.

A telegraph line across the Sahara Desert, which has a total length of nearly 3000 miles, is under construction by the French Government. It has been built from the city of Algiers to the Oasis of Tuat, and then follows an old caravan trail to Timbuctoo, ending on the Atlantic Coast, at the port of Dakar, in the Province of Senegal.

The United States Bureau of Engraving and Printing

Its Power Plant and Mechanical Equipment.

BY CHAS. A. BLATCHLEY, PHILADELPHIA, FORMER CHIEF OF ENGINEERING AND MACHINE DIVISION.

To the visitor at the national capital, one of the most interesting groups of buildings is that of the Bureau of Engraving and Printing. Its special interest is undoubtedly due to the fact that all currency, both national and bank, and all postage and revenue stamps are printed there, and every visitor is anxious to learn how Uncle Sam manufactures his paper money and stamps. Over 3000 persons are employed in this work, and more than 500,000 sheets of finished securities are turned out daily.

General Features of the Plant.

The electric motor drive is used on all power machinery throughout the plant. About 250 motors, ranging from 1-6 to 40 hp., are required for the work, and dur-

bureau. All of the boilers are fitted with down draft smokeless furnaces of the Dutch oven type, using bituminous coal under natural draft. The smoke breeching from both high and low pressure boilers enters an iron bound brick stack 200 ft. in height. A damper regulator is attached to the breeching dampers of each set of boilers.

Coal is delivered in carts, and after passing through a crusher it is carried by a bucket conveyor to the storage bins of 600 tons capacity, located above the boilers. The same conveyor travels under the floor of the boiler room and takes the ashes to an elevated ash bin, from which they are loaded directly into carts. A traveling scale, running the length of the boiler room, receives the



Fig. 1.—A Section of the Ink Mixing Room, Showing Storage Tanks for Burned Oil in the Background.

ing the summer months upward of 280 desk and ceiling fans are in daily operation. The lighting equipment of the buildings and grounds comprises 16 arc, 50 mercury vapor and about 4000 incandescent lamps.

There are four buildings included in the group, designated as the main building, south building, west building and stable and laundry building. Power is generated by a central plant located on the ground floor and near the center of the south building. Brick and cement lined tunnels connect this building with the main and west buildings, and through these the steam piping and electric cables pass to the distributing centers. The stable and laundry building is connected to the power plant by means of underground terra cotta ducts carrying the electric cables and an iron conduit through which the steam and water piping passes.

The Boilers and Engines.

The boiler plant consists of three Aultman & Taylor water tube boilers of 250 hp. capacity each, supplying steam to the engines and pumps at 125 lb. pressure, and four Campbell & Zell water tube boilers, each having a rating of 125 hp. at 70 lb. pressure, which furnish the steam for the washing and drying requirements of the

coal from the storage bins and discharges it into the feeding hoppers placed directly over the furnaces.

The conveyor, crusher and traveling scales are each operated by a fully inclosed electric motor.

The engine equipment consists of four horizontal tandem compound condensing engines, directly connected to 220-volt D. C. generators. Two of the units comprise 450-hp. Corliss engines and 300-kw. generators, the remaining two units being 200-hp. automatic engines and 125-kw. generators. All of the exhaust piping and the receivers between the high and low pressure cylinders are placed in the basement, together with the condensers and vacuum pumps. The piping to each set of vacuum pumps is so arranged that either pump may be used with either of its corresponding engines. A vacuum of 28 in. is maintained on the exhaust lines. Vacuum and steam gauges are mounted on a gauge board in the engine room, recording gauges being also provided for both the high and low pressure lines.

An automatic oiling system cares for the lubrication of the engines and generators at all points where oil cups are required. The engine cylinders are provided with hand pump and sight feed lubricators. Force feed lubricators are attached to all pumps, excepting the high pres-

sure hydraulic and one or two of the less important pumps. A 90-gal. elevated oil tank supplies the automatic system, the oil being transmitted entirely by gravity. Regular sight feed oil cups are provided, in addition to the automatic feeds, and these are kept filled ready for immediate service independent of the oiling system. The waste oil is collected and carried by gravity to a filter in the basement, after passing through which it is pumped to the supply tank and again returned to the system.

A branch exhaust line, provided with stop valve and oil separator, supplies the steam for heating the buildings in winter, over 20,000 sq. ft. of radiation being required. The vacuum return system is used throughout, $\frac{1}{4}$ lb. pressure being maintained on the supply and 10 in. of vacuum on the return lines. A connection, controlled by cut-off and reducing valves, is made to the heating main from the low pressure boilers, thus insuring continuous heating service during the daylight hours on Sundays when the

erator or from two or more generators operating in parallel.

Lead covered cables are used, both between the generators and the switchboard and between the switchboard and the various distributing centers. These cables are supported on iron cable racks beneath the floor of the engine room and to the walls of the basements and tunnels.

The Pump Room and Machine Shop.

In the pump room, communicating with the engine and boiler rooms on the north, are located the boiler feed, house service and hydraulic pressure pumps, the last delivering water to the hydraulic presses in the main building at 5000 lb. pressure. The house service pumps supply water to closed tanks in the attic of the main building and are automatically controlled by the pressure in the tanks. These pumps are also connected with an extra heavy pipe line leading to the hose outlets

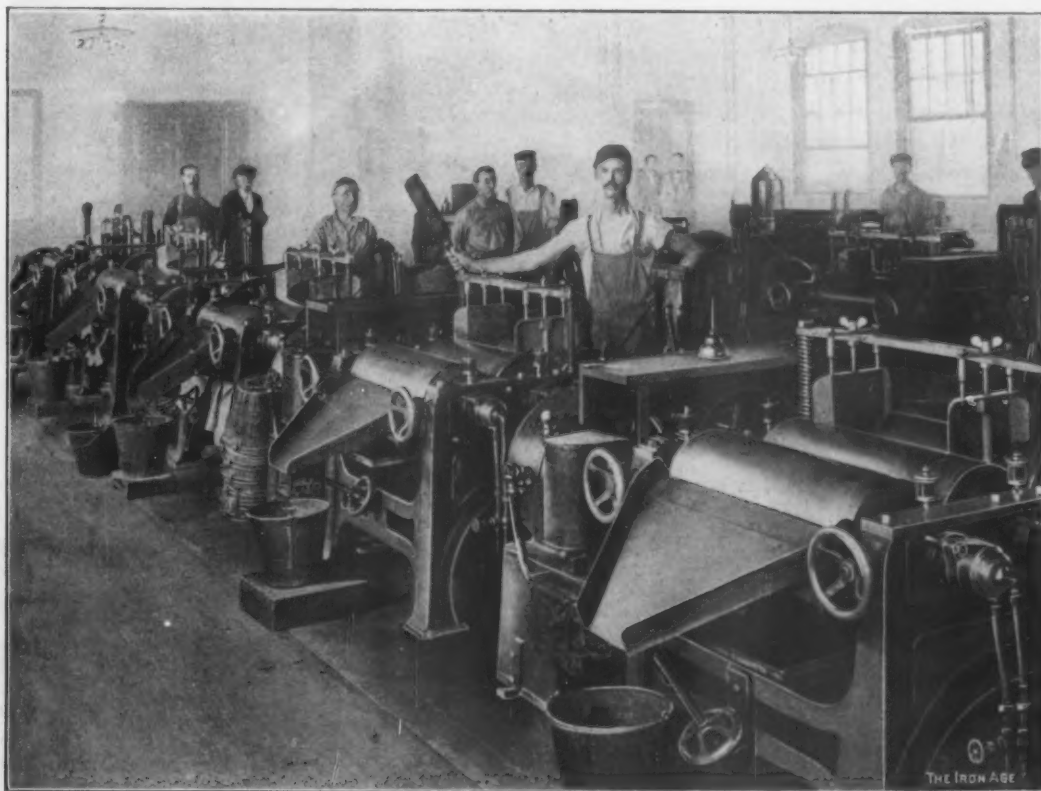


Fig. 2.—A Portion of the Ink Grinding Room.

engine plant is not in operation. The condensation from the heating system is returned to the boilers.

The Electric System.

The two wire 220-volt system of electric distribution is used for both light and power service, 226 volts being maintained at the switchboard. The large units carry the load from 7 a. m. until midnight, at which time the load has diminished to such an extent that it can be readily handled by the smaller units.

The main switchboard, consisting of 15 panels of pink Tennessee marble, is 30 ft. long and 7 $\frac{1}{2}$ ft. high, and is provided with two sets of triple bus bars, one set for the lighting and one for the power distribution. Two ammeters and two voltmeters of the illuminated dial type are mounted on hinged metal arms at one end of the board. One of the voltmeters indicates the bus bar voltage and the other that of the generators, while each ammeter is connected to a set of buses.

The first three panels from the left hand end of the board are used for the distribution of the lighting circuits, the next four are the generator panels, the center is the equalizing panel and the remaining seven are used for the distribution of power. The generator switches are so arranged that the light and power buses can be fed from independent generators, from the same gen-

throughout the buildings, and they can be instantly thrown on this line, maintaining any desired pressure for fire service. The pumps are operated at 80 lb. steam pressure, the steam being taken from the high pressure main and transmitted through reducing valves.

Adjoining the power plant on the east are the shops for the repair and maintenance of the machinery and buildings. These shops are operated by electric motors. The equipment consists of various sizes of engine lathes, planers, shapers, universal grinder, milling machine, drill presses, universal boring mill, pipe cutting and threading machines, wood working machinery, &c.

The Ink Making Plant.

To the west of the power plant is located the ink making plant, where all of the inks used throughout the bureau are prepared. The proper proportions of dry color, burned oil, &c., required for each tint and color are mixed in power mixers operated from a motor driven line shaft. A section of the ink mixing room, with the storage tanks for burned oil in the background, is shown in Fig. 1.

From the mixers the inks are taken to the grinding room, a portion of which is shown in Fig. 2, where they are thoroughly ground upon three roller water cooled mills. There are 11 of these mills, each operated by an

electric motor. The motors are of $7\frac{1}{2}$ and 10 hp. capacity and are either geared directly to the mills or operate them through silent chain drives. The ink is delivered to the pressrooms in sheet metal pails of 14 quarts capacity, about 6000 lb. being consumed each day.

The paper used for the various forms of securities is

to take up readily the fine lines of the engraving and to permit the ink to take a firmer hold on the fiber of the paper.

The Hand Plate Presses.

All of the currency, the higher denominations of postage stamps, and a large portion of the revenue work are



Fig. 3.—General View of the Main Hand Plate Pressroom.—This Room Is Lighted with Mercury Vapor Lamps.



Fig. 4.—Some of the Presses Used in Putting the Serial Numbers on Currency.

purchased by yearly contracts and, in most cases, is delivered to the bureau in sheets of the required sizes for printing.

The paper for the currency, postage stamps and for certain revenue stamps is dampened before going to the press. This is done so that it may be softened sufficiently

printed on hand plate presses, of which there are over 500 in use in the bureau. An average of over 400 of these are used in the printing of the currency alone. Fig. 3 gives a general view of the main hand plate pressroom, showing a portion of the distribution of mercury vapor lamps.

Excepting in the cases of the higher denominations,

the notes are printed four on a sheet arranged in a single vertical row. The backs of the notes are first printed, and the sheets sent from the presses to the drying room. Here they are spread on wire trays, from 100 to 200 sheets being placed on each tray, and a slight draught of heated air is passed over them for several hours, setting the ink as well as thoroughly drying the paper. The air used for the drying work is drawn over steam coils by a motor driven fan located on the floor below the drying room, and is delivered in horizontal jets at the rear of each tray from small openings in the air supply pipe.

After the sheets have been dried they are carefully examined for imperfections, and sent to the wetting room for redampening in preparation for the printing of the faces of the notes. After this second printing the sheets are returned to the drying room and when dry are re-examined. They are then passed through a sizing bath by means of tape carriers and pressing rolls. Nine sizing machines are required for this work, about $2\frac{1}{2}$ lb. of the sizing liquid being consumed by each 1000 sheets.

In proper sequence down the sheet, the numbers on each head advancing by four after each impression. Twenty-two of these presses are required, each operated by a 1 hp. motor through worm drive and gear reduction. A number of these presses are shown in Fig. 4.

The treasury notes are now ready for delivery to the Treasury Department, where the seal and denomination number are put on each note and the sheets separated into individual notes. The bank notes, however, are sent to the surface printing room, where the charter number of the bank is placed on the notes. This work is done on flat bed, stop cylinder presses, directly geared to electric motors. The bank notes are now placed in the vaults and delivered in whole sheets upon requisition from the Department. About 200,000 sheets of currency are turned out daily.

The Printing of Postage Stamps.

With the exception of the special delivery, the stamps used in the booklets, and those of denominations above

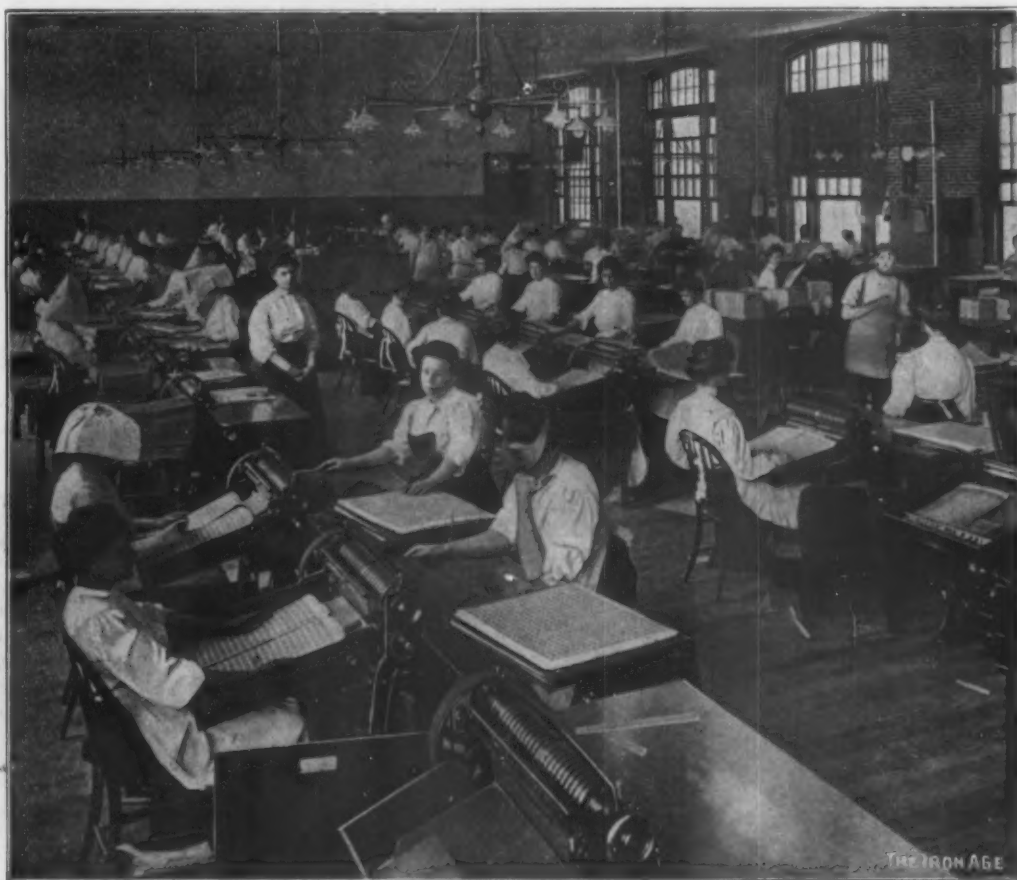


Fig. 5.—Some of the Power Plate Printing Presses Used in Printing Postage Stamps.

The sheets are now returned to the drying room for the third drying, which takes but a short time, and then go to the hydraulic press room. Here they are placed between cardboard tissues and subjected to a pressure of 5000 lb. per sq. in. Eight hydraulic presses are operated in this room, the pressure being obtained from the pumps located in the pump room of the power plant and controlled from the press room.

After pressing, the notes are taken to the trimming room, where the edges of the sheets are trimmed by passing them between revolving circular shears directly geared to 1-6 hp. motors. Twenty-five of these equipments are necessary to handle the work.

Printing the Serial Letter and Number.

The notes are now ready for the serial letter and number. These are placed near the lower left and upper right hand corners of each of the four notes on a sheet, at a single impression, by four pairs of numbering heads, placed in the proper relative position on the type cylinder of a rotary printing press. The type figures on each pair of heads are so set that the notes will be numbered

15 cents, the postage stamps are printed 400 on a sheet, arranged in 20 vertical and 20 horizontal rows. This work is done on 22 power plate printing presses, each directly geared to a 5-hp. motor. Four engraved plates are used on each press, the plates being fastened to horizontal planks, which are attached at equal intervals to an endless sprocket chain traveling in a horizontal plane. The plates thus follow one another at regular intervals, passing first under the inking roller, then under the mechanically operated wiping cloth, where all surplus ink is wiped from the surface of the plate; the blank sheet of paper is then placed on the plate and it passes under the impression roller. After the impression has been taken the paper is removed and the plate again passes under the inking roller, the same cycle of operations being repeated. Nine impressions, or 3600 stamps, are printed on each press per minute. Fig. 5 gives a view of some of these presses. The mercury vapor lamp is also used for the illumination of this room.

The postage stamp paper, like that used for the notes, is dampened before printing and is sent directly from

the presses to the drying room. Here it is dried in the same manner as the note paper, except that the air used in drying is not heated to so high a temperature. From here the stamps go to the hydraulic press room, where they go through the same process as described for the notes and are then delivered to the gumming room.

The Gumming Equipment

consists of eight electrically driven machines, to which the sheets of stamps are fed in the same manner as paper is fed to an ordinary printing press. The sheets are carried, face down, under a ground glass roller, which revolves in front of a hopper containing the liquid gum. The gum is thus deposited on the reverse side of the sheets, and front and side grippers, attached to an endless chain, carry the sheets through a closed box 50 ft. in length. In their passage through this box the sheets pass under a number of jets of heated air, the travel of the air in the box being opposed to that of the sheets. The gum has been thoroughly dried on reaching the delivery end of the machine, where the grippers automatically release the sheets, the chain traveling back under the box to the feeding end.

Fig. 6 shows the feeding end of six of these machines.



Fig. 6.—The Feeding End of Some of the Gumming Machines.

The covered vertical pipes in the foreground are the outlets for the heated air, one of the inlet pipes being shown in the background at the far end of the machines.

The heated air used in these machines is forced over steam coils by a blower fan driven by a 25-hp. motor, the fan and coils being located in an adjoining room. The gum is prepared in large steam jacketed copper kettles, and is delivered to the machines by a small power pump. Twenty-six pounds of liquid gum are consumed by each 1000 sheets of stamps, about 70,000 sheets being turned out per day.

Perforating the Stamps.

The next step in the preparation of the stamps is the perforating, 34 machines, each belted to a $\frac{1}{2}$ -hp. motor, being used in this work. These machines consist principally of two parallel shafts revolving in opposite directions. On the upper shaft are placed a series of pinned wheels, while a corresponding series of die wheels are located on the lower shaft, each pair of wheels just meshing sufficiently to make a clean perforation. The machines which perforate the stamps vertically have these wheels set at distances corresponding to the width of the stamps, while on the machines used for horizontal perforating the wheels are set to correspond to the height of the stamps. A pair of circular cutting knives is located at the

center of each set of shafts, so that the operation of perforating the sheets also cuts them in two down the center. The stamps are delivered from the gumming room in full sheets of 400 stamps each. The first machine perforates these in one direction and separates them into two sheets of 200 stamps each. The second machine, taking these smaller sheets and perforating them in the other direction, again separates them into two sheets each containing 100 stamps. Fig. 7 is a general view of the perforating room.

Considerable skill and care are required in the adjustment and timing of the various elements of these machines, in order that the sheets may be fed in line with, and at the proper speed for, the perforating wheels. The alignment and meshing of the pin and die wheels must also be carefully done, to insure straight and perfect perforation.

As they are delivered from the perforating machines the sheets of stamps are placed between cardboard tissues, and are passed through a heavy, electrically operated roller press, upon leaving which they are perfectly smooth and flat. They are now carefully examined for imperfections and the perfect sheets are made up into packages

and sealed. These packages are sent to the vaults, where they are held ready for delivery to the various post offices, by requisition through the Post Office Department.

After being perforated, the stamps for the booklets are sent to the stamp book room, where the paraffin paper is placed between the sheets and the backs and faces of the books are assembled. These books are bound in strips of 10, glued and stitched and finally separated into individual books by means of cutting machines. All of the machinery in the room is operated by individual motors, seven wire stitchers, four paper cutters and one rotary separator being used in the work. The books are packed in pasteboard boxes for delivery to the post offices.

Dry Paper Printing.

Such revenue work as is not printed on plate presses is done on dry paper by surface printing, and practically all numbering required in the revenue work and on the various forms of securities, except the serial numbering of the notes, is done on surface presses. The equipment of this branch consists of 21 flat bed stop cylinder presses, 8 pony cylinder presses and 3 automatic feed high speed rotary presses. Each press is motor driven, the connection between the motor and press being gears, silent chain or belting, according to the type of press and the general requirements of its work.

On the delivery end of one of the automatic presses is attached a set of perforating knives, through which the sheet passes on its way from the impression cylinder to the delivery table, the printing and perforating being thus accomplished in one operation. The three automatically fed presses turn out about 90,000 sheets per day, corresponding to the output of 12 flat bed presses. The press having the perforating attachment also does the work of four perforating machines.

The revenue work done on the plate presses is dried and pressed in the same manner as the notes and is perforated on machines similar to those used in perforating the stamps, except that the perforations are in the form of a slit in the paper instead of round hole perforations. The perforating wheels in these machines consist of circular knives with serrated edges meshing between the cutting edges of a pair of die wheels. Forty of these machines are required for the daily output of

sure. Twenty-three transfer presses are required in the making of the plates.

Maceration of Redeemed Securities.

All currency and other Government securities which have been redeemed by the Department are never re-issued, but are destroyed by maceration. About 2000 lb. of paper, representing a monetary value of from \$1,500,000 to \$2,000,000, are destroyed each day. These securities are placed in large steam tight cylinders and the proper portions of lime and soda ash are added. The cylinders are then closed and steam is admitted at 20 lb. pressure. In this condition the cylinders are slowly revolved for a period of 36 hr., when the contents are reduced to a fibrous mass. This is mixed with water and pumped into an agitating tank, whence it passes to a wet pulp machine, where it is converted into paper pulp. It is then dried on a series of steam coils and made up into

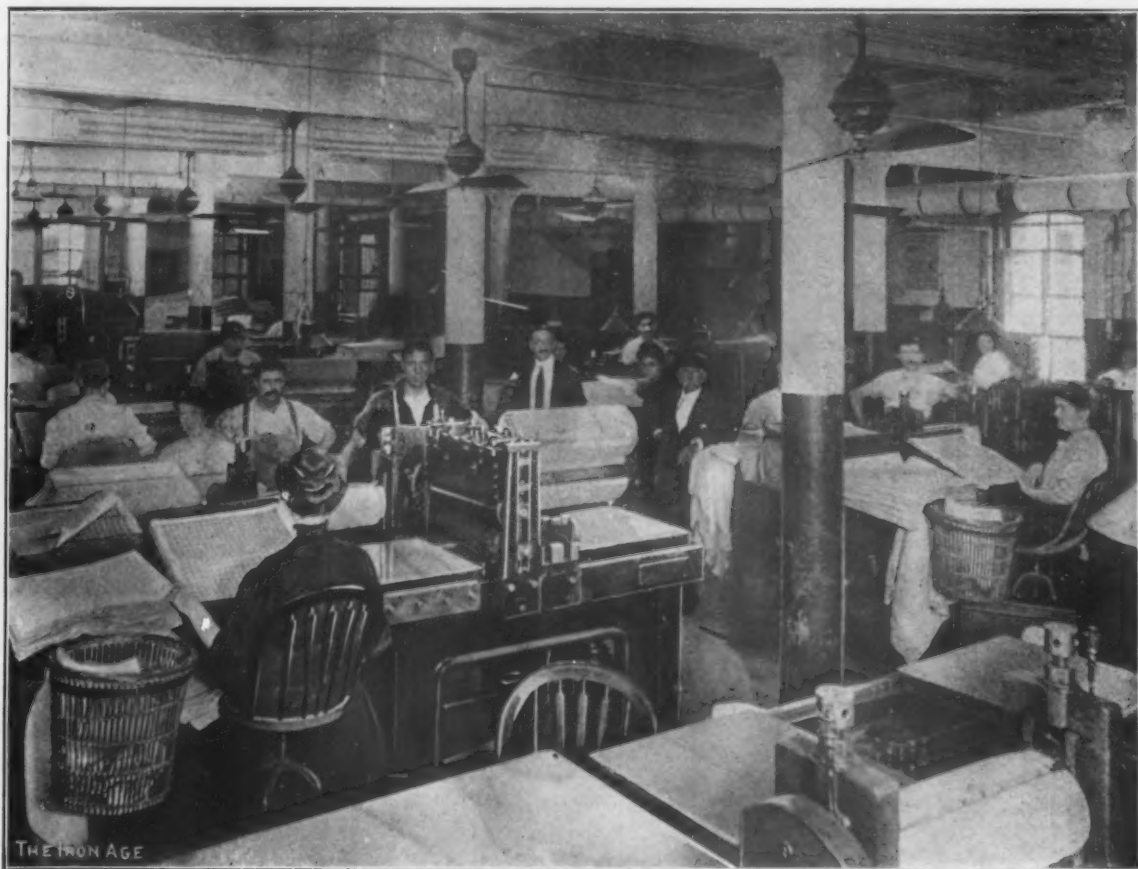


Fig. 7.—General View of the Stamp Perforating Room.

approximately 200,000 sheets. Each machine is belted to a $\frac{1}{2}$ -hp. motor.

Transfer Presses.

In the engraving of the plates from which the various securities are printed each subject is divided into a number of units or parts, and each part is engraved on a separate piece of soft steel. This steel is then hardened, and by means of heavy transfer presses a number of negative reproductions of the engraving are made upon the circumference of a soft steel roll. The roll is then hardened, and by again placing it in the transfer press a positive impression can be produced on a soft steel plate. These plates are of the proper size to receive the four notes, or 400 stamps, &c., as may be required for the printed sheet. Positive reproductions from the various rolls, covering the different parts of any subject, are thus assembled in their relative positions on the plates, the whole forming the complete subject. The plates are then hardened and are ready for printing. Fig. 8 is a row of these transfer presses, a number of plates and rolls showing on the table in the foreground.

The plates and rolls are hardened in cyanide furnaces using a mixture of illuminating gas and air under pres-

sure. The pulp is sold to the highest bidder by yearly contract. Four macerating cylinders are required. All of the machinery is driven from line shafting by a 40-hp. motor.

Besides the equipments described, a laundry is provided for washing, starching and drying the wiping cloths used on the plate presses. The daily output of the laundry consists of 9500 hand cloths 30 x 60 in., and 85 cloths for power presses 2 ft. wide by 60 yd. long. Twelve iron cylinder washers, three metal starchers, three wringers, 10 mangles and two drying boxes, heated by steam coils and fans, are used in this work. The condensation from the mangles and heating coils is trapped and delivered to an elevated tank, from which it is drawn for use in the washing machines. The entire equipment is operated from a motor driven line shaft.

Before the installation of the power plant and the introduction of electric motor drives the Bureau was operated by means of small isolated steam engines, supplied from a central boiler plant, and an extensive system of line and countershafting, with the necessary cumbersome and heavy belting. The centralizing of the power plant and the adoption of the electric motor as a means for

driving all power machinery have done away with all heavy belting and its attendant evils, have eliminated a yearly bill of several thousand dollars for outside electric service in connection with the lighting of the buildings and, in spite of a considerable increase in the output have reduced the coal consumption from 8000 to 6800 tons per year.

Efficiency of the Organization.

In the earlier part of this article the fact is mentioned that approximately 3000 employees are required for turning out 500,000 sheets. At first sight this may appear to be a very small output for the number of employees and the equipment described. A careful study of existing conditions and requirements of the work, while in charge of the engineering division for the past five years, warrants the writer, however, in saying that this is not the case, but that the Bureau is on an equal footing as to quantity of work turned out per employee with the average large printing and engraving establishment, and is far above the average plant in the quality of the work. In considering the output of the Bureau, the fact must not be lost sight of that the material turned out is of

must not be here confused. For the former, no agent can compare with electricity. For the latter, however, it will be more economical to employ producer gas and pipe than electricity and cables.

New German Specifications for Street Rails.

The German Tramways and Local Railways Union has adopted the report of its committee on specifications for rails, fish plates, sleepers, tie bars, &c. The first paragraph of the specification for grooved rails provides that such rails shall be of "hard ingot steel," and adds: "The method of manufacture, as well as the chemical composition of the metal, shall be left to the manufacturer, but should, nevertheless, be made known to the client on his request." The *London Light Railway and Tramway Journal* says that while British engineers have been adamant before the claim of steel manufacturers, they should not be tied hand and foot by specifications, but should be judged by the behavior of their products. The specification prescribes tests, including one for



Fig. 8.—A Row of Transfer Presses, Showing Plates and Rolls in the Foreground.

intrinsic value, and frequent counts and checkings are required to insure its safety in passing from one operation to another, the notes alone being subjected to 54 such countings in their process of manufacture.

All the engraving, which is of the highest grade, and all die sinking are done at the Bureau, as well as the manufacture of all ink, glue and sizing used in the work. In addition a large number of counters and examiners are required, an efficient watch force must be maintained, and numbers of cleaners, laborers and mechanics employed in the maintenance of the buildings and machinery. All of these, together with the executive staff, may be classified as nonproductive, but must be included in the total number of employees. When all these facts are taken into consideration the Bureau may be said to rank among the most efficient plants of its kind in the country.

In pointing out some of the possibilities of power gas, an English engineer says that it is especially in transmission work that the great future of a cheap producer gas lies. It is only recently that the centralized generation of gas power has been considered. It is said that it will be much cheaper to manufacture producer gas and to transmit it through pipes to industrial centers than is the case with electricity, which so readily adapts itself to this sort of production and transmission. The questions of the distribution and transmission of power

ascertaining the structure of the metal by means of acid and micrographic tests. The usual falling weight test is to be supplemented by a compression test, in which a steel ball 19 mm. in diameter is used. With a pressure of 50,000 kg. the depth of any impression made by this ball must not be less than 3.5 mm. or more than 4.5 mm. Our London contemporary, referring to the provision for a five-year guarantee on rails and one of two years on accessories, says: "The guarantee is to cover all defects or faults of quality, manufacture, and of workmanship. This gives the reason for the abandonment of the specification as to material and chemical analysis. The German tramway engineers and managers appear to think they are amply protected by the guarantee, and therefore may safely give up the specification as to the sort and composition of the metal. We doubt, however, whether any British consulting engineer would adopt a similar course."

For estimating the horsepower which can be transmitted by a wire rope drive a method given in *Ice and Refrigeration* is to multiply the speed of the rope by three times the weight of rope in the span. In other words, take three times the product of the span in feet, the weight of the rope in pounds per foot of length, and the speed of operation in feet per minute, and divide the result by 33,000. This is said to give an average value on a conservative basis.

The American Variable Speed Planers.

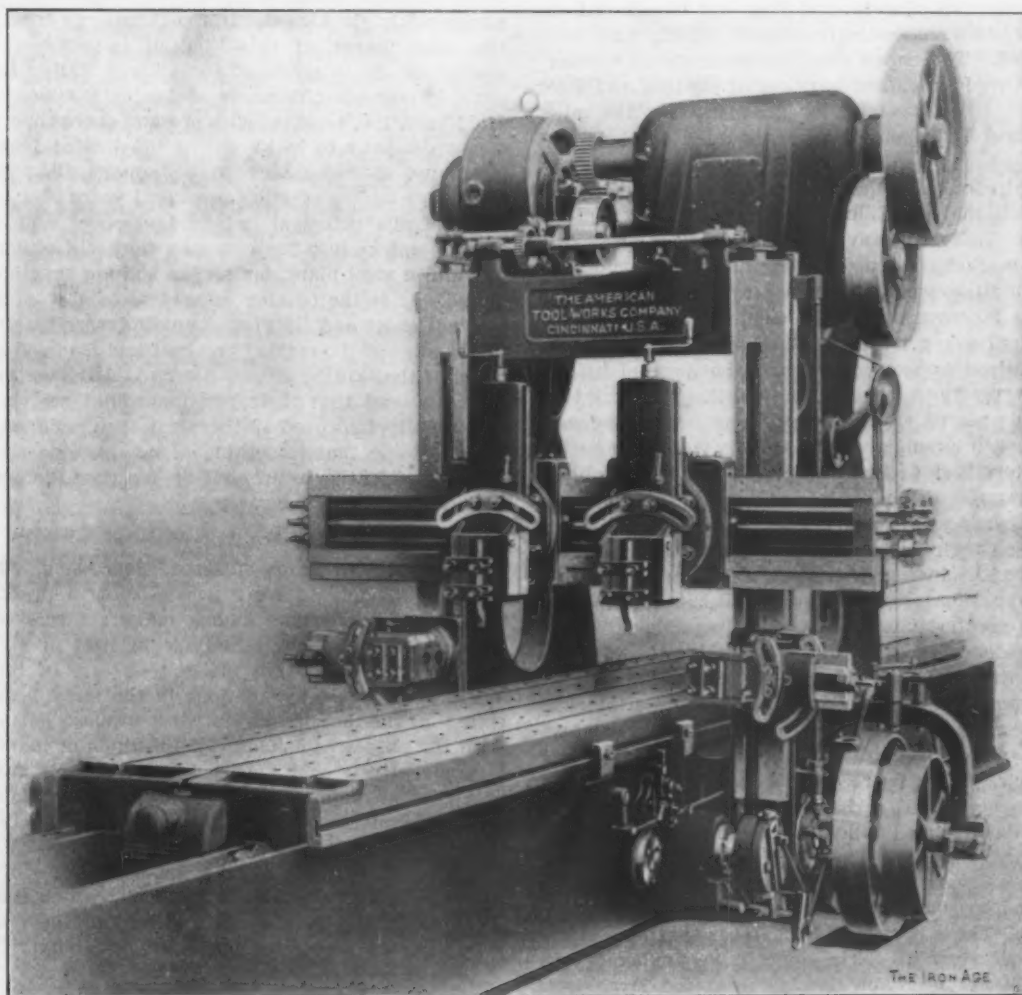
One of the important factors in the present active endeavor to reduce shop costs has been the raising of the producing capacity of machine tools. To meet the added requirements imposed on tools which it manufactures, the American Tool Works Company, Cincinnati, Ohio, has developed a line of variable speed planers wherewith the cutting speed may be quickly altered to suit different classes of work. The American variable speed planers are built in two types, one with four cutting speeds and the other with two cutting speeds, each having a constant speed return of the platen which is much faster than its respective highest cutting speed. The first type is made either for belt or motor drive, the second only for belt drive.

The four cutting speeds in the planer of the first men-

their shafts. Special cutters are used in the making of the gears and pinions, which are calculated to produce them with the greatest accuracy, and afford them long wearing and quiet running qualities.

Any of the four speeds may be obtained by manipulating two convenient levers. A safety locking device prevents the engaging of two conflicting speeds at the same time, and an index plate shows clearly how to obtain the desired speed.

The driving pulleys have flywheel rims, the momentum of which diminishes shocks to the driving mechanism, due to intermittent cutting and reversing, and also conduces to a steady, even pull at the cutting tool. They are carefully balanced, eliminating vibration even at the highest speeds. Corresponding attention, it is claimed, has been given to all of the planer's details, so that it is capable of producing a finished job of planing that requires little if any handwork in fitting.



The Four-Speed Electric Driven Planer Built by the American Tool Works Company, Cincinnati, Ohio.

tioned type are obtained through a speed box, which was designed with a view to efficiency, simplicity and durability. The four speeds were thoughtfully selected to embrace those most frequently required in modern planer work. These, with the constant high speed return of the platen, it is believed, insure the best working economy. The speed box is bolted to the top of the housings, which are of special design and very substantial. It is symmetrical in appearance and being completely inclosed enables an economical use of oil and prevents it being scattered about. All shafts in the speed box run in long bronze bushed bearings provided with ring oilers. To avoid trappy construction and the likelihood of slippage friction clutches and drives have not been employed, so that the pulling power of the planer is without the limitations they would impose. The gears run in oil, which prolongs their life and reduces the noise of their running. They are of ample proportions, with wide face and coarse pitch. The pinions are all steel and are in one piece with

Electric motor drive is provided on the machine illustrated, but the arrangement is such that should the motor become disabled the driving pinion on the outside of the speed box may be replaced by a pulley and the planer driven by belt from a countershaft or another motor conveniently placed. This flexibility appears to forestall any chance of the machine being long out of commission. A planer originally belt driven may be readily converted to motor drive at any time after installation.

The belt driven form of planer, provided with two cutting speeds, obtains them through a single and efficient two-speed countershaft, which is attached to the ceiling in the usual manner. This countershaft by virtue of its self-oiling feature requires little attention, and is claimed to be exceptionally long lived.

The largest pin factory in the world is said to be that at Birmingham, England, which has a daily output of 37,000,000 pins.

THE PITTSBURGH IRON TRADE IN 1906.

BY ROBERT A. WALKER, PITTSBURGH, PA.

General Features.

Prior to 1906 the best years in the iron trade were 1902 and 1905, but when compared with the wonderful prosperity of the entire year of 1906 these two previous years make a rather modest showing. It will be recalled that the year 1904 was what is termed a lean year, and the early part of 1905 did not show much improvement. However, along in May and June, 1905, conditions took a turn for the better. The demand commenced to improve, prices became firmer and the volume of business materially increased. Before the year 1905 closed business was in a very prosperous condition, the furnaces and mills being full of work, and that year closed with an outlook for 1906 exceedingly bright, which has been fully realized. The entire year has been one of wonderful activity, rapid advances in prices of pig iron and steel taking place and a demand for products that the mills could not meet and make deliveries wanted by their customers.

Financial conditions that existed all through the year 1906 were all that could have been desired, the country being practically free of any important failures, and while the money market tightened up several times during the year this condition was only temporary and did not cause any serious inconvenience. The enormous crops in the West required every locomotive and car that could possibly be utilized to move them, and the demand by the country for greater transportation facilities was such that the railroads placed enormous contracts for rolling mill equipment, such as engines and cars, as well as for steel rails and terminal facilities that simply swamped the concerns manufacturing railroad supplies, and the year closed with their works many weeks behind in deliveries and orders on their books sufficient to take their product for some months in the new year.

A prominent feature of the year, and one which is imparting the greatest benefit that could possibly accrue to the iron trade, is the fact that practical control of the market is in the hands of six or eight of the leading steel companies, and the conservative policy of these interests in the matter of prices, even with an insatiable demand, was never more strongly illustrated than in the year under review. There were many times when consumers would have been glad to have paid premiums for spot delivery on materials, but with the conservative policy that has always characterized the handling of the market when it took on a runaway appearance prices were held in check and on some lines were not changed during the entire year. There is no doubt whatever that a runaway market would certainly have come in September or October had it not been for the fact that the large steel interests, like the United States Steel Corporation, Jones & Laughlin Steel Company, Lackawanna Steel Company and others, persistently refused to advance prices unless conditions absolutely forced it. This control of the situation and the conservative policy that has always marked the policy of the leading interests are most aptly illustrated when we state that two of the leading finished products, these being steel bars and steel plates, the demand for which through the whole year was enormously heavy, were advanced only once by the Western mills and that was but \$2 a ton. In the matter of structural steel 1906 was a record breaker, the mills being congested with work nearly all through the year, and prices at its close were exactly on the same basis as when the year opened. The charge has been frequently made that the United States Steel Corporation is a monopoly, but this interest makes only about 60 per cent. of the steel output of the country and does not make a single article in iron or steel that cannot be bought freely and openly from other producers. It is a fact, however, that the Steel Corporation has had more to do with giving stability to the market than any other single interest, and this has resulted in almost unlimited benefit to all other iron and

steel manufacturers, whether large or small, and to the whole country as well. It is recognized that a steel market on a conservative basis as regards prices is more likely to be permanent than a market unduly high and which is inevitably followed by a reaction that depresses prices to a lower point than actual conditions may warrant.

A feature of the year was the limited number of new consolidations in the iron and steel trades, and it seems that the day for these has about passed. Several attempts were made to unite some of the more important independent mills into one company, but the promoters of these projects found so little encouragement that they were quickly abandoned. In the Pittsburgh District about the only change of this kind of importance was the merger of the interests of the Cherry Valley Iron Company, having blast furnaces at Leetonia, Ohio, and West Middlesex, Pa., together with ore and coal properties, into a new company to be known as the United Iron & Steel Company, to become effective January 10. There has been more or less of talk for several years of a merger of some of the principal independent sheet and tin plate manufacturers into one company that will either acquire or build a steel plant, but so far nothing tangible has resulted. It is the opinion of several of the leading independent sheet and tin plate manufacturers that the absolute control of the market on sheet and tin bars by two or three of the leading steel concerns is detrimental to their interests and that their position would be more secure and greatly improved if they had their own steel plant. It is possible that something along this line may be accomplished in the future, but at this time the outlook for it is not very promising.

Price Agreements.

It is only in times of severe depression, when competition is likely to force prices below a profit making point, that agreements among manufacturers to control prices seem necessary. Activity in 1906 in all lines of trade was so great that prices took care of themselves. There are now no associations in the strict sense of the term, but the manufacturers work in close harmony, and with the excessive demand for all kinds of material it is a comparatively easy matter to control the market. The fact that an understanding existed among leading mills as to prices, together with the conservative policy of the Steel Corporation and the other large interests, no doubt prevented a runaway market on some lines of finished material, more particularly plates, for which the demand all through the year was greater than the mills could furnish, even when running to full capacity.

New Construction.

The year 1906 was one of marked activity in new construction of blast furnaces and iron and steel plants, and from all indications it will be exceeded by 1907, for which year an extensive programme of new construction and improvements to existing plants has been arranged by the United States Steel Corporation and other large interests. Some large new erection was made during the year in the Pittsburgh, Wheeling, Youngstown and New Castle districts, and the capacity of these centers for making pig iron and steel was very greatly increased. During the year the Carnegie Steel Company spent a vast amount of money in new construction in the Pittsburgh District, as also did the Jones & Laughlin Steel Company, the National Tube Company and other leading interests. The Carnegie Steel Company built two additional finishing mills at its Clairton Works, and pushed construction steadily on two more blast furnaces at the Carrie plant, which when completed will make seven furnaces where formerly there were only two. The Carnegie Company has also made large additions to capacity at the Homestead Works, including the building of 12 50-ton open hearth furnaces, which were completed and put in operation in September. The National Tube Company has

about completed the rebuilding of its new works at McKeesport, on which over \$5,000,000 has been spent, a full account of the extensions made to this plant having appeared in *The Iron Age* of November 8. The new blast furnace added by this company at McKeesport gives it a total of three stacks, with a daily output of about 1500 tons.

The Jones & Laughlin Steel Company finished during the year the building of a large mill for rolling the medium sizes of structural steel, which was erected in record breaking time and was fully illustrated and described in *The Iron Age* of July 5. This company, late in the year, made official announcement of its long contemplated plans for the building of a new plant at Aliquippa, Pa., where it owns upward of 800 acres of choice manufacturing property. It has let contracts to the Riter-Conley Mfg. Company for the building of four blast furnaces, each to have a daily capacity of 500 tons, and there will also be built six Talbot open hearth furnaces, a blooming mill and sufficient bee hive coke ovens to furnish coke for the four furnaces. Other large construction is contemplated by the company at Aliquippa, to include plate, structural and rail mills. Definite official announcement of these additional mills will likely be made by the company early in the new year.

The American Sheet & Tin Plate Company has also made material extensions to its works in the Pittsburgh District and has greatly increased its capacity. Other concerns have spent large sums of money in bettering the physical condition of their plants and in making extensions and in adding new equipment.

In the Youngstown District the principal addition to capacity was the large new and modern Bessemer steel plant built by the Youngstown Sheet & Tube Company, which was fully described in *The Iron Age* of August 2. This is the only new Bessemer steel plant built in the Pittsburgh or Valley districts for some years, and was erected by the company for the purpose of supplying steel to its pipe, tube and sheet mills, and also for the purpose of furnishing billets, sheet and tin bars to the outside sheet and tin plate mills, of which there are quite a number within easy reach of Youngstown.

In the Wheeling District the La Belle Iron Works has been active in making extensions to its plant, having let contracts late in the year for additions to its open hearth capacity, and also for the building of eight hot sheet mills to roll up to No. 30, two jobbing mills, galvanizing and corrugating plants and an open hearth furnace. This company will be an active factor in the sheet trade about the middle of the new year. The Wheeling Steel & Iron Company also made some improvements and additions to its works, which included the rebuilding of two of its blast furnaces and the erection of a large plate mill. In the New Castle, Pa., District, which includes Sharon and South Sharon, the Carnegie Steel Company has made some large additions to existing works, while the Shenango Furnace Company will build at Sharpsville two new blast furnaces, work on one of which has already been started.

The official programme of new construction issued by the United States Steel Corporation and printed in *The Iron Age* of December 13, gives a clear idea of the immense sums of money that will be spent at its different plants in new construction during 1907. In the Pittsburgh District the Carnegie Company will build two blast furnaces and 18 open hearth furnaces at the Duquesne Works, and the feature of interest in connection with this new construction is that when these new open hearth furnaces shall have been finished the present Bessemer plant, which has a capacity of nearly 2000 tons a day and which is modern in all respects, will be dismantled. At the Clairton Works of the Carnegie Company 14-in. and 22-in. structural mills will be erected. At the Ohio Works of the Carnegie Company at Youngstown two new blast furnaces of 450 tons capacity each, 12 open hearth furnaces of 60 tons capacity each and blooming and plate mills will be built. The company will also erect at Youngstown a foundry for making ingot molds, having secured its supply in the open market heretofore. At Lorain, Ohio, the National Tube Company will build a new blast furnace with a daily capacity of 450 tons, most of the castings for which have already

been made. There will also be built at Lorain six open hearth furnaces of 60 tons capacity each and a new galvanizing plant. At the McKeesport, Pa., plant of the National Tube Company a new blast furnace is to be added, giving this works a total of four stacks. The American Sheet & Tin Plate Company will make large additions to its various sheet and tin plate mills in the Pittsburgh District, among which will be the reconstruction of the Scottdale Works, which when completed will make this its second largest sheet plant, the Vandergrift Works easily taking first place.

The amount of new construction under way and authorized for 1907 has filled up the large engineering concerns, such as the United Engineering & Foundry Company, Mesta Machine Company, Garrison Foundry Company, Geo. A. Hogg Iron & Steel Foundry Company and others with work for a year to 18 months. The Riter-Conley Mfg. Company, one of the oldest concerns in the Pittsburgh District engaged in steel construction work, will enter the new year with enough orders on its books to keep it busy through all of 1907 and well into 1908. This company is building the blast furnaces at the new plant of the Indiana Steel Company at Gary, Ind., and secured in December the contract for the four blast furnaces to be built by the Jones & Laughlin Steel Company at Aliquippa.

Labor Matters.

The Pittsburgh and adjacent districts were practically free of labor disturbances in the iron and steel trades during the year, the wage scale for bar mills, sheet and tin plate mills with the Amalgamated Association having been speedily settled, without any shutdown of the mills whatever. In the Eastern District the Amalgamated Association made a demand on the bar mills for recognition and an increase in the wage scale which at first was refused but was finally granted by some after a shutdown of several months. Labor during 1906 has been more fully employed and at probably a higher wage than ever before. In fact, during the year there was an absolute scarcity of labor at manufacturing plants, particularly in the Pittsburgh and Valley districts, and also in the ore and coke regions. At times the output of coke was seriously restricted because of scarcity of labor and coke operators are now paying the highest wages in effect in the Connellsville region for some years. The trouble between the Amalgamated Association and the Whitaker-Glesner Company, operating sheet and tin plate mills in Wheeling, W. Va., and Martins Ferry, Ohio, was settled early in the year, to the entire satisfaction of both sides. The close of the year finds labor fully employed and a scarcity of men in nearly all branches of manufacturing business.

Early in December the United States Steel Corporation announced a voluntary advance in wages, to take place January 1, which is expected to affect upward of 150,000 men. Blast furnace operators in the Mahoning and Shenango valleys and in the Pittsburgh District also decided in December to advance blast furnace labor 10 cents a day, effective January 1. It is probable that other large steel interests that do not recognize labor organizations in any way will voluntarily advance the wages of their employees early in the new year. The amount of tonnage on the books of the mills for 1907 delivery and the unprecedented amount of new construction to be carried on in 1907-1908 fully indicate that labor of all kinds will find steady employment for a long time and at a high rate of wage.

Foreign Trade.

Exports of iron and steel products during 1906 show an increase as compared with the preceding year, notwithstanding the enormous domestic demand. The United States Steel Corporation and affiliated interests, through the export department, secured some very large foreign orders during the year, consisting of sheet and tin bars, pipe and wire goods. A notable order for export taken in December was one for nearly 300 miles of 8-in. line pipe, taken by the National Tube Company, for delivery to the Burmah Oil Company, Burmah, India. The National Tube Company has made constant shipments of tubular goods abroad during the year and the American Steel &

Wire Company has done the same with wire products. Our manufacturers believe that it is good policy not to relinquish foreign trade, but rather to cultivate it, knowing that it will be needed when the lean times come during which domestic consumption will not be able to take our greatly increased output of iron and steel products.

Pig Iron.

In the pig iron trade the year 1906 stands out as a record breaker as regards the quantity turned out. In the Pittsburgh District the output of pig iron in 1906 ran very close to 6,000,000 tons, or nearly 25 per cent. of the output of the entire country. Some enormous records for output were made at the Edgar Thomson and Duquesne blast furnaces of the Carnegie Company and also at the Eliza furnaces of the Jones & Laughlin Steel Company. By the close of 1907 the capacity for pig iron production in the Pittsburgh District will be largely increased, as the two Carrie furnaces now being built by the Carnegie Company will be completed early in 1907 and two of the four blast furnaces to be built by the Jones & Laughlin Steel Company at Aliquippa are expected to be ready for blast in July or August, and the others by the close of the year. It is also probable that the two new blast furnaces to be built by the Carnegie Company at Duquesne and the new stack of the National Tube Company at McKeesport will be making iron before the end of 1907. Work on these new stacks will be rushed as fast as possible, and they are expected to be erected in record breaking time.

Bessemer Pig.

The year 1906 opened with a fairly active demand and prices exceedingly strong. At this stage the market was showing indications of the wonderful activity which characterized it through the entire year. In the first week of January Bessemer iron was selling at \$17.50, at Valley furnace, or \$18.35, Pittsburgh. About January 15 the Steel Corporation came in the market and bought 85,000 tons for delivery in first quarter at \$17.25, Valley furnace, the business being divided between W. P. Snyder & Co. and the Bessemer Pig Iron Association. This large purchase had the effect of firming up the market considerably and the price held at \$17.25 to \$17.50 until about May, when the market commenced to move up rapidly. During the first half of the year the Steel Corporation, Cambria Steel Company, Republic Iron & Steel Company and Youngstown Sheet & Tube Company were heavy buyers. In June, the Sharpsville Furnace Company, which took over a small blast furnace at Sharpsville, Pa., sold its entire product, about 150 tons a day, for the balance of the year to the Jones & Laughlin Steel Company.

Early in July the price advanced to \$17.75 for prompt delivery, while \$17.25 to \$17.50 was quoted for forward shipment. After July the market advanced rapidly in spite of the fact that the Steel Corporation had stopped buying, and at the close of the year Bessemer iron for prompt shipment was bringing \$23 to \$24, at furnace. However, it should be noted that the bulk of the tonnage of Bessemer sold during 1906 was at prices running from \$17.25, the lowest, up to about \$22, the highest. The year closed with the output of the Valley furnaces practically sold up for the first half of 1907 and at good prices. Average prices of Bessemer pig iron, f.o.b. Valley furnace, for each month in 1906 were as follows:

January	\$17.32	July	\$17.57
February	17.29	August	17.96
March	17.29	September	18.44
April	17.25	October	20.06
May	17.24	November	21.96
June	17.38	December	22.50

Indications are that prices for first half of 1907 will not be below \$22.50, at Valley furnace, and possibly the average for the first six months may be higher than that figure. In this connection it is interesting to note that several round sales of Bessemer iron for delivery in last half of 1907 have been made, on the basis of about \$21, at maker's furnace.

Foundry Iron.

The demand for foundry iron was heavy during all of 1906. The year opened with Northern No. 2 foundry selling in round lots at \$16.25 to \$16.50, Valley furnace,

while higher prices were asked for small lots. These prices continued in force but a short time, as early in February Northern No. 2 was quoted at \$17 to \$17.25, Valley, and the market was strong. In April there was a slight recession in prices, Northern No. 2 being offered as low as \$16 to \$16.25, Valley furnace. These prices continued in force until about July, when on account of heavy purchases, and in sympathy with Bessemer iron, foundry commenced to move up, and steadily advanced in price the balance of the year, while the demand was unusually heavy. In December small lots of Northern No. 2 for prompt shipment sold as high as \$25 at furnace, while about \$23.50 to \$24 was quoted for delivery in first quarter of 1907. The furnaces making foundry iron entered the new year with a large tonnage on their books for delivery through first and second quarters.

Gray Forge Iron.

The market on gray forge iron in 1906 was active practically all through the year, especially in the last three or four months, during which the demand was unusually heavy, and prices showed a sharp advance. The year opened with forge iron selling at \$16.25, Valley furnace, or \$17.10, Pittsburgh. In March the market was slightly weaker, ruling at \$16, and about the middle of April the market weakened still further, Northern forge being offered as low as \$15.50 at furnace or \$16.35, Pittsburgh. It continued to rule at about this price or slightly less until August, when, in sympathy with Bessemer and foundry iron, prices commenced to advance, and the demand improved materially. At the close of the year, forge iron was selling at \$22, Valley furnace, or \$22.85, Pittsburgh, showing an advance of fully \$7 a ton over the lowest price ruling early in the year.

Connellsville Coke.

The demand and prices for coke are usually governed by the condition of the pig iron market, and as this was quite active all through the year, especially in the last half, it naturally followed that the demand for both furnace and foundry coke was extremely active through all of 1906, especially in the last four months of the year. When 1906 opened, Connellsville furnace coke was selling at about \$2.50 a ton, at oven, and the output was slightly in excess of the demand. There was not much change in the market until March, when the price declined to \$2.25, at oven, or less, the demand being only fair. In April the demand and prices were slightly better, but it was not until July that the upward movement in prices and the heavy demand really started. Early in August furnace coke for prompt shipment was scarce and was bringing \$2.50 to \$2.75, at oven, and foundry coke \$3 a ton. The demand continued heavy to the close of the year and prices advanced steadily, the year closing with Connellsville furnace coke selling for prompt delivery as high as \$3.60 a ton, at oven, and 72-hr. foundry as high as \$4.25 a ton, at oven.

A feature of the coke situation in the latter part of the year was the buying up of the output of a number of the principal works in the Connellsville region by the H. C. Frick Coke Company for delivery in the first half and in some cases through all of next year. Coke oven building in the Connellsville and adjacent regions was very active in the latter part of the year, and all indications point to an enormous output of coke in the new year. It is estimated that the Upper and Lower Connellsville regions turned out in 1906 between 18,000,000 and 19,000,000 tons of coke, exceeding the record in 1905 by about 3,000,000 tons.

Steel Billets.

The year 1906 was a very active one in the steel trade, the demand for billets, sheet and tin bars through the entire year being greater than the supply. During the last half of the year many finishing mills, especially sheet and tin plate concerns, were unable to get deliveries of bars as fast as needed, which greatly restricted operations. The Carnegie Steel Company increased its output of steel by the building of a new open hearth plant at Homestead, while the Youngstown Sheet & Tube Company finished and started its Bessemer plant in August,

which is good for 1500 tons a day, when working to full capacity.

The year 1906 opened with Bessemer billets selling at \$26, while sheet and tin bars were bringing about \$27, maker's mill. As early as February the shortage in supply of steel was being felt and premiums were being paid for billets, sheet and tin bars for prompt delivery. On April 1 the Carnegie Steel Company advanced its prices on billets \$2 a ton, or from \$25 to \$27, and the same on sheet and tin bars, or from \$26 to \$28, Pittsburgh. The market continued on this basis until May, when the demand was not quite so active and prices were slightly lower, Bessemer billets being offered at this time rather freely at \$26, Pittsburgh.

On July 1 the Carnegie Steel Company again advanced sheet and tin bars \$1 a ton, or from \$28 to \$29, Pittsburgh, Bessemer billets bringing at this time \$27 and open hearth about \$28, Pittsburgh. When July was reached the scarcity in supply of steel was more keenly felt, Bessemer billets for prompt delivery bringing \$27.50 to \$28, and open hearth \$28 to \$29, Pittsburgh. In September it became evident that the supply of steel was much less than actual consumptive needs, Bessemer billets bringing \$28 and \$29 and open hearth as high as \$30, Pittsburgh. In the latter part of October Bessemer billets were selling as high as \$29, Wheeling, or \$29.95, Pittsburgh. The year closed with steel still very scarce, Bessemer billets bringing \$29 to \$30 and open hearth \$32.50 to \$33, Pittsburgh. Prices on sheet and tin bars in the last three months of the year ranged from \$29.50 to \$30, Pittsburgh, for random lengths. In some cases higher prices were paid for sheet and tin bars for prompt delivery.

Steel Rails.

The price of standard sections during all of 1906 was \$28 at mill. The rail output for 1906 is estimated at about 3,250,000 tons and the mills entered the new year with a heavy tonnage of unfilled orders on their books, as well as an enormous tonnage of new orders. The Carnegie Steel Company is sold up for the first half of the year. Some splendid records for output of rails were made at the Edgar Thomson plant of the Carnegie Company during 1906, the product in March having been over 82,000 tons, while in October all former records for output were beaten when this plant turned out 89,846 tons. The Republic Iron & Steel Company discontinued making steel rails in the summer, putting its entire rolling capacity on billets and sheet and tin bars. It has entered a very large tonnage for delivery in the first half of this year. The demand for light rails was unusually active during the whole year, prices ruling from \$3 to \$4 a ton higher at the close of the year than when it opened.

Finished Iron and Steel.

New records for demand and output of finished products must be accorded to the year 1906, which in every way was the most active in finished lines the iron trade has ever seen. The year opened with steel plates selling on the basis of 1.60 cent, Pittsburgh, the demand being fairly active and the mills filled up for two or three months. This price continued in force until about October, when on account of heavy demand and high prices of steel the Eastern mills advanced prices \$2 a ton, this action being followed by the Carnegie Steel Company and Jones & Laughlin Steel Company, making the base price of plates 1.70 cents, Pittsburgh, while the Eastern mills were quoting as high as 1.80 cents and later 1.90 cents for reasonably prompt delivery.

The demand for structural steel all through 1906 was enormously heavy, but prices were not advanced, being the same at the close of the year as when it opened. Large additions to capacity for rolling structural shapes were made during the year by the Jones & Laughlin Steel Company and the Carnegie Steel Company. The total tonnage entered by the American Bridge Company during 1906 is estimated at over 700,000, being by far the heaviest year in its history.

The demand for black and galvanized sheets was very active, prices being advanced several times, the year closing with No. 28 black sheets on the basis of 2.60

cents Pittsburgh, and galvanized 3.65 cents for No. 28. Effective January 8, 1906, the American Sheet & Tin Plate Company advanced prices on black sheets \$2 a ton, or from 2.30 to 2.40 cents, and the same on galvanized, or from 3.35 to 3.45 cents for No. 28. A similar advance was made on June 5 and again on October 25, so that during the year there were three distinct advances in prices of black and galvanized sheets of \$2 a ton each, or \$6 in all.

The demand for tin plate was active through nearly the entire year, especially in the last half, and there were three advances in prices during the year, one on January 8 of 10 cents a box, or from \$3.40 to \$3.50, Pittsburgh; on April 9, prices were advanced 10 cents a box, or from \$3.50 to \$3.60; on May 18 another advance of 15 cents was made, or from \$3.60 to \$3.75; on October 25 another advance of 15 cents, or from \$3.75 to \$3.90 per base box, was made. This price was in effect at the close of the year and was 50 cents per box higher than the price in force when the year opened.

The demand for steel bars, steel pipe and tubes was unusually heavy all through the year, but only one advance was made in prices of steel bars, this being \$2 a ton. Prices on merchant pipe ruled very low most of the year, the extreme discount on merchant steel pipe being 81 and 5 per cent. off to the large trade. This price was in effect until October 12, when an advance of two points, or \$4 a ton, was made. This was followed by an advance of one point, or \$2 a ton, on December 5, and the same advance was made on December 21, so that during the entire year there were three advances amounting to four points, or \$8 a ton. The demand for boiler tubes was only fair the first half of the year but was very active in the last two or three months. Only one advance was made in prices in 1906, this being an advance of two points, or \$4 a ton, made on December 20. The mills making finished iron and steel entered the new year with an enormous tonnage of unfilled orders on their books, and the outlook for 1907 is all that could be desired from every point of view.

Shop Lighting.—A feature of incandescent electric lighting in shops and factories that has been greatly neglected is the provision of proper connections from the wire mains to the lamps used on the machines. The common practice has been to carry a double flexible cord from the nearest lamp socket to a portable lamp hung on some rickety fixture attached to the machine. That this practice is not only slovenly but actually dangerous besides has been shown frequently by the experience of unfortunate operators, who have been badly burned or shocked by short circuits. Not only this, but the use of lamp cord in such a manner is wasteful. It lies around on the floor, where the insulation is bruised and soon destroyed, and the amount of cord that may be needlessly used up in a large shop in the course of a year is a considerable item. Where the proper attention is given to this feature of machine shop equipment, the machines are wired the same as a building, the wires being carried up inside the columns of the machines in insulated cables. Sockets are provided at various convenient points, in which a plug, connected to a short length of flexible cord, can be inserted. The nearest socket will then be used to suit the convenience of the work. With machines wired in this manner, the length of flexible cord required is short.

A rock crusher built by the Power & Mining Machinery Company, Cudahy, Wis., is of such size and capacity as to be called the largest of its kind in existence. It weighs about 100 tons, and, as its capacity is quite 700 tons of rock per hour, it will be seen that it can consume its own weight of material in about 8½ minutes. It has been installed at Little Falls, N. Y., the product in the shape of crushed stone being used for railroad ballast and concrete work. The by-products, all of the dust and finely powdered stone and other material accruing from the normal operation of the machine, are to be used for the making of cement bricks.

The New Dudgeon Hydraulic Jack.

To those unfamiliar with its history, it may be interesting to know that the original hydraulic jack was invented by Richard Dudgeon, and patented in 1851. Essentially, the jack consisted of a cylinder in which was

of hydraulic jacks is accomplished in three ways: By opening all the valves which are used in operating the jack; by opening one of the valves and allowing the fluid to flow past the remaining valve; or by opening an independent lowering valve.

In the first jack shown at the left in Fig. 1 both valves were forced open, the suction or piston valve by a

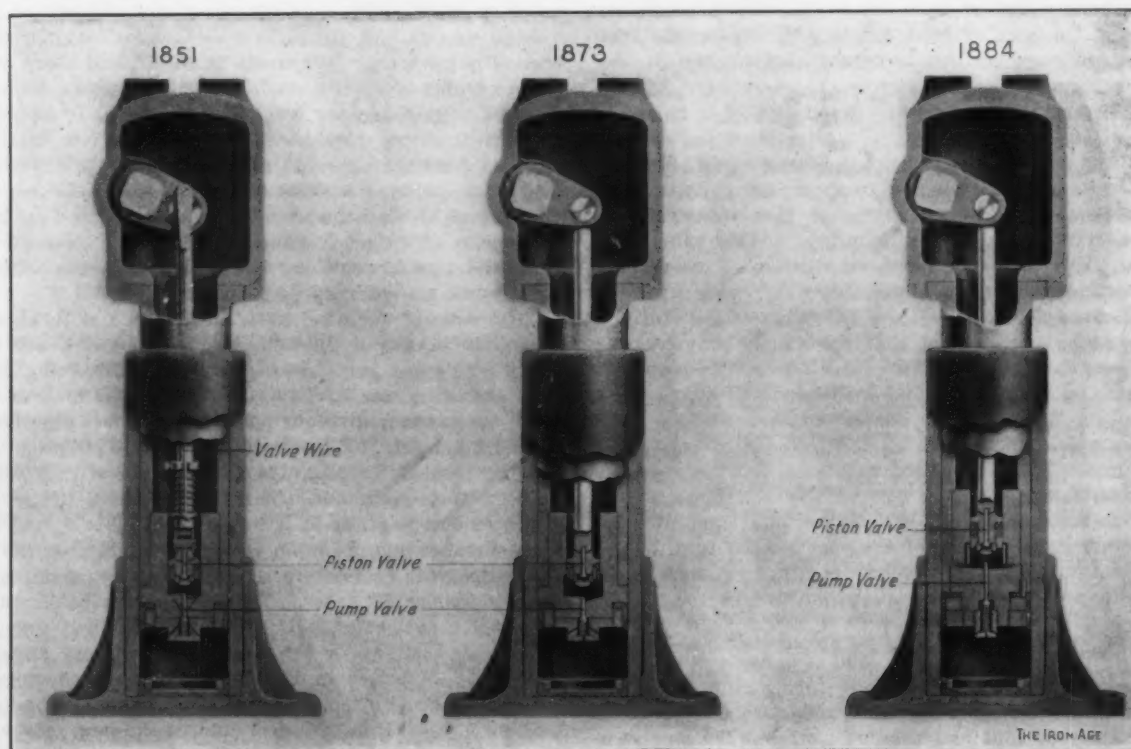


Fig. 1.—Sectional Views of the Dudgeon Hydraulic Jacks Patented in 1851, 1873 and 1884.



Fig. 2.—Exterior Views of the 1906 Dudgeon Jack, Showing the Three Types of Base Furnished.

fitted a hollow ram containing a liquid reservoir, and having at its lower extremity a piston pump, operated by hand, for forcing the liquid from the reservoir into the space beneath the ram in the cylinder, causing the ram to rise. This is the basic principle of all hydraulic jacks, and such modifications as have been made are mainly in the method of lowering the jack. The lowering

wire and the pressure or pump valve by the piston, thus allowing the liquid to flow back into the reservoir, as the ram descends. This construction was faulty in that the wire was liable to buckle, or bend from a sudden or undue strain, and render the valve-opening mechanism inoperative. In 1873 Dudgeon patented an improved form of jack, the second in Fig. 1, which did away with the

valve wire, the piston, as before, forcing the pump valve from its seat, while the suction valve was by-passed by depressing the piston below its normal limit of stroke into an enlargement of the pump bore. A defect in this jack developed in the pump. If the piston was allowed to remain long in the recess at the end of the pump bore the leather packing swelled, and when the pump was withdrawn from the recess the packing was likely to be stripped from the piston. In the form of pump patented in 1884 by Dudgeon, also shown in Fig. 1, the enlarged recess at the base of the piston was omitted, and in its stead passages were formed in the walls of the pump to allow the liquid to flow around the packing.

In all of these jacks two valves were used, one a suction valve and the other a pressure valve, the former being a part of the piston. In some forms of hydraulic jacks an independent valve has been used for lowering, but this has the objection that it necessitates two pressure valves and doubles the liability of the jack to become inoperative without in any way increasing its efficiency. This is particularly true of the double pump form of jack which has heretofore required a special and separate lowering valve.

The 1906 type of jack, to which the name Dudgeon is still applied, embodies improvements in the valve arrangement invented by James W. Nelson, manager for the firm of Richard Dudgeon. In this new jack the lowering is done by forcing all of the valves from their seats, not by a wire, nor by the piston, but by a steel tube, which cannot be bent or buckled. The packing of the pump does not come in contact with openings into by-pass passages in the wall of the pump.

The special feature of this jack is that all of the valves are assembled in one chamber, one above the other, so that only one pressure valve is used, even with multiple plungers. Other double pump jacks require three pressure valves and two suction valves (five in all), while this jack has but one pressure valve and two suction valves (three valves in all), of which but one of the latter is used at a time. A single passage between the pressure chamber and the reservoir closed by three valves takes the place of three passages in other double pump jacks, each closed by a single valve.

The operation of the jack may be clearly understood from the sectional view given in Fig. 3. This shows a double pump jack, the second or upper piston being practically merely a means of doubling the effective area of the lower piston. With both pumps in action a jack of 30 tons maximum capacity will lift a load of 15 tons at the rate of 1 in. in every six strokes. With only the lower pump working 30 tons may be raised 1 in. with 12 strokes. The pumps are controlled by a valve handle that may also be used for lowering the jack, although the jack may be lowered in the usual way by the operating lever when reversed in its socket. When the valve handle is in the position shown in the engraving the cam at the end of its shaft allows the push tube to be held up by the coiled spring at its lower end, so that all of the valves are free to seat. The single pump action is obtained when the valve handle is turned down to a vertical position, which revolves the cam sufficiently to unseat the upper valve, so that the upper piston ceases to work, the liquid displaced by it simply surging back and forth through the open suction valve. With this condition only the two lower valves are used, the middle one being the suction valve for the lower piston. Turning the valve handle to the opposite horizontal position unseats all of the valves, allowing the ram to descend by its own weight. To lower the jack by means of the operating lever the arm is depressed until a pin projecting from the lower side of the piston head encounters the top of the push tube, when it performs the same office as the cam on the valve handle shaft.

The modified form of base which is to be noticed on this jack is recommended not only on account of its lightness, but because the cylinder is stronger than with the ordinary type of base, where the cylinder is threaded to correspond with a thread at the top of the base instead of near the bottom. The jacks are, however, furnished with the usual types of base when so preferred. Fig. 2 shows

exterior views of the 1906 railroad jack, the universal plain jack and universal base jack.

A feature peculiar to this new 1906 type of jack is that it can be fully extended horizontally. The older types cannot, because the pump is so located that it becomes unsubmerged when the ram is run out about half way. As the valve bore of the new Dudgeon jack is off center, and as the pump can be located in the ram so that the valve bore is on the lower side, the ram can be extended full length horizontally as well as vertically. The head is screwed on the ram, but as it is impossible to insure the head being always located at the same angle to the ram, an adjustment is given to the pump by means of four equidistant holes in the pump collar, allowing an adjustment of the valve bore to within 45 degrees of the

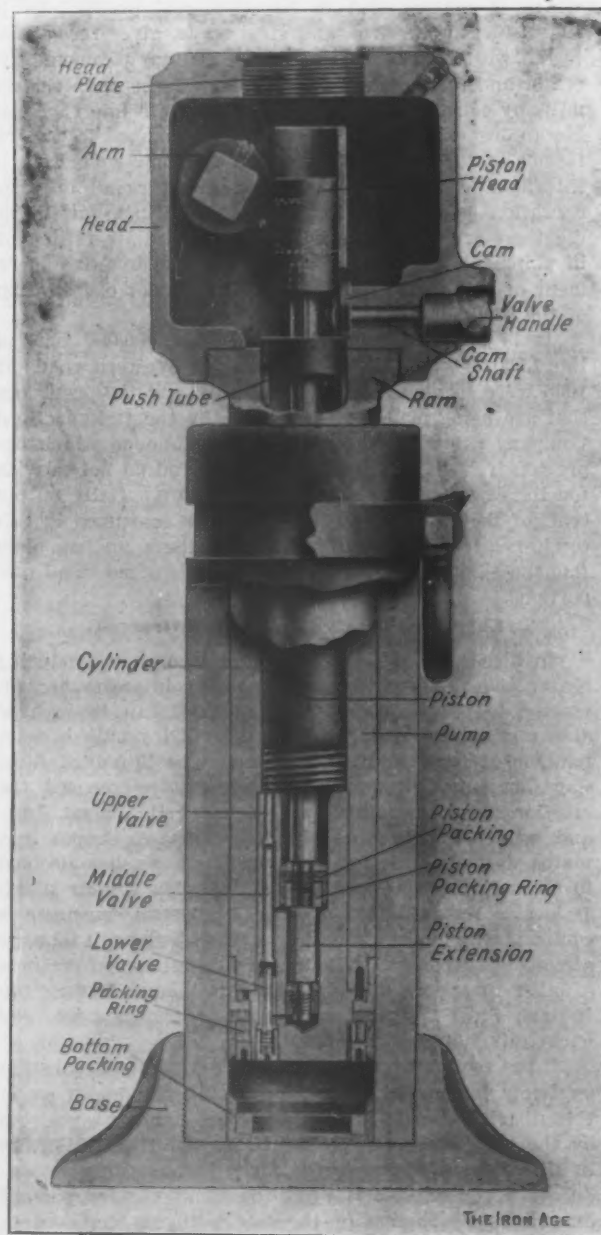


Fig. 3.—Sectional View of the 1906 Dudgeon Jack.

lever of the jack. Ordinarily when a jack is used horizontally the throw plane of the lever is vertical, but if for any reason this is impossible the valve bore of the pump may be located in respect to the ram so as to run the ram out horizontally to its full length with the lever working at any angle.

The accessibility of the interior parts is another distinctive feature of this jack. The valves are reached by removing the ram and unscrewing the bonnet, when the valves with the removable seat will drop out. The piston packings are reached by unscrewing a plate in the head and lifting the piston through the opening. This is a very desirable advantage in doing away with the necessity of unscrewing the head from the ram to reach the piston packing and valve.

THE CHICAGO IRON TRADE IN 1906.

BY A. O. BACKERT, CHICAGO.

Great Extensions in Producing Capacity.

First in importance of the year's developments in the Chicago iron trade is the projected increase in the producing capacity of not only the United States Steel Corporation's subsidiaries but of independent manufacturers as well. The extensions outlined are of such magnitude that they promise a growth in the total pig iron output of the district amounting to 77 per cent., of steel 85 per cent., and proportionate additions to the finishing capacity to convert this increased tonnage. This expansion, which is unparalleled in its wonderful proportions in the history of the iron and steel trade, gives recognition to the westward movement of the country's consumptive center and foreshadows a lesser dependence upon eastern mills by consumers west of the Ohio State line than has heretofore existed. What economic changes in the relations of the manufacturers that are now competing in this field will be developed as a direct result of these operations can only be surmised at this time, but the indications are that there will be no immediate falling off in shipments from the East, as the consumptive increment of this territory equals, if it does not exceed, that of the producing capacity.

It is approximately estimated that 900,000 tons of the 1,500,000 tons of rails rolled for Western roads in 1906 were furnished by Eastern mills, and the provisions that are being made at Gary, Ind., by the Indiana Steel Company are only sufficient for this tonnage which has previously been unnaturally diverted, and do not provide for increased requirements in the future. Fully 50 per cent. of the bars and structural shapes consumed in this territory are made in mills East of Indiana, and the plate tonnage shipped in by these producers is of no small proportions.

Large Consuming Interests Attracted.

In discussing the growth of Chicago as a producing center the fact that large consuming interests are attracted to points where their material can be secured at a minimum carrying cost, and involving only a short haul, is of paramount importance. The Standard Steel Car Company, Pittsburgh, has already commenced the erection of a large steel car works at Hammond, Ind., and will use approximately 1000 tons of shapes and plates daily, while the Pullman Company has decided to expend \$5,000,000 on the erection of a similar plant. It is also reported that another large steel consumer is contemplating a site near Gary, and with the rail tonnage already assured, and without curtailing the proportions of other lines now shared by Eastern manufacturers, the Indiana Steel Company will begin operations next year with fully 1,500,000 tons in sight.

In no section of the country is the Steel Corporation as firmly entrenched from a producing standpoint as in this district, and it is making more secure its position by the stupendous Gary operations. Of the steel made in Illinois and Wisconsin the Steel Corporation now produces 75 per cent., and upon the completion of present extensions its portion of the total will be increased to 80 per cent. Including projected operations, which consist of two 14 furnace open hearth plants for the Indiana Steel Company, the corporation's future production will be 85 per cent., and that of the independent interests will have declined to 15 per cent. Practically the same figures apply in the finished lines, although they may vary a few points in favor of the independent manufacturers.

Upon completion of stacks now under erection the merchant furnace capacity of this section will be increased 71 per cent., and including the projected plants an increase over the present output of 143 per cent. is promised. Outside shippers, however, will not be greatly affected by this tremendous growth, as this territory will always be dependent on the South and other sections for a large proportion of its requirements of the foundry grades.

Extensions Summarized.

Extensions to the iron and steel producing capacity completed during the year and those under construction and contemplated are given below:

Blast Furnaces.

Blast furnaces completed in 1906, annual capacity 360,000 tons:

One, South Works, Illinois Steel Company, 180,000 tons per annum.

One, Joliet Works, Illinois Steel Company, 180,000 tons per annum.

Blast furnaces under construction, annual capacity 1,100,000 tons:

Four, Indiana Steel Company, Gary, Ind., annual capacity 720,000 tons.

One, Inland Steel Company, Indiana Harbor, Ind., annual capacity 140,000 tons.

One, Federal Furnace Company, South Deering, annual capacity 125,000 tons.

One, Northwestern Iron Company, Mayville, Wis., annual capacity 125,000 tons.

Blast furnaces projected, annual capacity 1,100,000 tons:

Four, Indiana Steel Company, Gary, Ind., annual capacity 720,000 tons.

One, Federal Furnace Company, South Deering, annual capacity 125,000 tons.

One, Inland Steel Company, Indiana Harbor, Ind., annual capacity 140,000 tons.

One, Iroquois Furnace Company, South Chicago, annual capacity 125,000 tons.

Open Hearth Steel Furnaces.

Open hearth steel furnaces completed, annual capacity, 210,000 tons:

Seven 50-ton furnaces, South Works, Illinois Steel Company.

One 50-ton furnace, Inland Steel Company, Indiana Harbor.

Open hearth steel furnaces under construction, annual capacity 1,290,000 tons:

Twenty-eight 60-ton furnaces, Indiana Steel Company, Gary, Ind.

Three 50-ton furnaces, Inland Steel Company, Indiana Harbor.

Projected open hearth steel furnaces, annual capacity 1,200,000 tons:

Twenty-eight 60-ton furnaces, Indiana Steel Company, Gary, Ind.

Finishing Mills.

Finishing capacity under construction:

Rail mills, annual capacity 990,000 tons—

Indiana Steel Company, Gary, Ind., rail mill to roll standard sections from open hearth steel, monthly capacity 75,000 tons.

Illinois Steel Company, South Chicago, 24-in. light rail mill to roll 12 to 45 lb. sections, monthly capacity 7500 tons.

Plate mills under construction, annual capacity 390,000 tons:

Illinois Steel Company, South Chicago, 30-in. universal plate mill to roll plates from 6 in. to 30 in. wide and 80 ft. long, monthly capacity 7500 tons.

Indiana Steel Company, Gary, Ind., sheared plate mill, monthly capacity 25,000 tons.

Bar mills (steel) under construction, annual capacity 510,000 tons:

Indiana Steel Company, Gary, Ind., four mills, 14-in., 12-in., 10-in. and 8-in., respectively, monthly capacity 30,000 tons.

International Harvester Company, South Deering, Morgan continuous bar mill, eight stands of 16-in. and three stands of 14-in. rolls, monthly capacity 6250 tons.

Inland Steel Company, Indiana Harbor, Ind., bar mill to roll down to 7/8-in. rounds, monthly capacity 6250 tons.

Miscellaneous finishing mills, projected and under construction:

Indiana Steel Company, Gary, Ind., blooming, slabbing and billet mills.

American Rolling Mill Corporation, Chicago, 21-in. and 10-in. mills to roll iron bars, monthly capacity 4000 tons.

Other additions completed during the year:

Illinois Steel Company, Joliet, track bolt plant, annual capacity 240,000 kegs; splice bar plant, annual capacity 120,000 tons.

Illinois Steel Company, Milwaukee, cooling beds and shear tables for bar mills.

The yielding of the Bessemer process, owing to the growing scarcity and high cost of suitable ores, is shown in the above extensions, all of which provide for the manufacture of steel on the open hearth. In no section of the country are conditions more favorable to the development of this practice than in the Chicago territory, as an abundance of scrap is always available from railroad sources. No steps have yet been taken to replace converters in the local mills with open hearth furnaces, the shortage of the present steel supply undoubtedly holding

this move in abeyance. That none of these furnaces will be of the acid type emphasizes the preferment of the consuming trade for basic material and marks a further decline in the development of the former.

Conservative Price Changes.

In view of the unprecedented activity which characterized the iron and steel trade throughout the entire year, price changes in finished lines were extremely conservative and reflected the restraining influence that can be wielded by the large consolidations for the maintenance of values. The widely scattered and diversified merchant furnace interests were unable to hold pig iron prices in check, and the upward movement of this commodity was indicative of the abnormal conditions which actually prevailed.

The decline in the spread between the cruder forms of steel and finished materials, although temporarily exaggerated, again directed the attention of the independent finishing mills to the importance of the absolute control of their raw material supply, and to guard against a recurrence of this situation additional steel producing capacity must be erected, as the available supply of the large interests for the open market is constantly being reduced, owing to the heavy requirements of their finishing departments, which have already overtaken their steel output. This condition is exemplified in the refusal of the Illinois Steel Company to accept contracts for specified tonnages of billets from large Western consumers for shipment the ensuing year. Eastern mills have been called upon to supply this deficiency, and heavier shipments than have heretofore been made from the South are anticipated in the future. No provisions are being made at Gary, Ind., to meet the requirements of the independent manufacturers, although in more normal periods a small tonnage may be available.

At the close of the year wire rods were selling in this market almost as high as wire nails, and rolling billets at an advance over steel bars. While this condition did not maintain in such a marked degree in other lines, nevertheless the cost of the raw material was maintained on a basis that netted little or no profit to the manufacturer not favored with his own steel supply.

Railroad and Lake Business.

Record purchases of equipment by the railroads contributed largely to the prosperity of the trade, as the extensions under way throughout the West and Northwest are only exceeded in magnitude by those undertaken by the railroad boom in the eighties, yet this rapid development is still inadequate to the needs of this growing country. The 1906 output of the rail mill of the Illinois Steel Company was sold up during the fall months of the preceding year, and 500,000 tons were transferred to the mills of the Carnegie Steel Company to be rolled at Braddock and Youngstown. Builders of freight cars carried over into this year orders for 175,860 cars, and on October 1 their accumulated contracts called for a total of 218,298 cars. In addition the orders for passenger coaches and interurban cars on their books reached totals of 1992 and 1500, respectively. Locomotive works, which in January had orders for 774, increased this total to 4323 on October 1. Within a few days after prices were announced the output for the local rail mill for the current year was sold, and it is conservatively estimated that 1,000,000 tons additional were diverted to Eastern makers by Western roads.

The activity of the lake shipyards is also noteworthy, berths having been reserved on the stocks for 60 freighters and passenger boats to be placed in commission in 1907, and the total steel consumption in the form of shapes and plates required in their construction is placed at over 200,000 tons.

Building Operations

exceeded in cost those of any previous year in the history of the city, and the number of office buildings and warehouses erected contributed largely to the heavy consumption of structural steel. Permits issued reached a total of 65,432,680, as compared to 62,500,000 in 1905, and 63,463,400 in 1892, when the city experienced its greatest building boom. The more notable structures, which in the aggregate required 45,000 tons of steel in their

construction, are as follows: County Building, Commercial National Bank, State street and Wabash avenue additions to Marshall Field & Co., Carson, Pierie, Scott & Co.'s addition, Auditorium Annex addition, International Harvester Building, Northern Trust Building, Fisher Building addition, Borland Building, addition to the clubhouse of the Chicago Athletic Association, Mentor Building, American Trust & Savings Bank, New Brevoort Hotel and Municipal Court.

Operations at Gary now under way will require approximately 35,000 tons, and 100,000 tons of plates and shapes will be used in the erection of the entire plant. All of this work is being done by the American Bridge Company, while additions to the South Works of the Illinois Steel Company, involving 15,000 tons of steel, were made by the North Works, this company's fabricating department. Montgomery, Ward & Co. have under erection what is claimed to be the largest warehouse in the world, and industrial operations involved an addition to the plant of the Western Electric Company and a car wheel foundry for the Griffin Wheel Company.

The warehousing facilities of local distributors were materially extended by the erection of additions to the plants of Joseph T. Ryerson & Son and the North Works of the Illinois Steel Company. Kelley, Maus & Co. completed a large warehouse and will branch out in the finished lines more extensively than heretofore. As a distributing center Chicago takes pre-eminent rank, and the stocks of shapes, plates, bars, sheets and tubes which are constantly carried are larger than those in any other center. Deferred mill shipments stimulated this trade abnormally throughout the year, but prices were maintained at a fair level despite this demand. The development of jobbing facilities of the North Works is being watched with keen interest in view of the reports which threaten the elimination of the middlemen by the Steel Corporation in the heavier lines. On direct mill shipments commissions have already been reduced, and the location of a large warehouse in New York for the distribution of finished material is taken as the forerunner of others to be located at advantageous jobbing points.

Labor Difficulties.

The molders' strike was the only labor difficulty of consequence in this and the Milwaukee districts, and while the union succeeded in signing many shops none affiliated with the National Founders' Association has weakened. The members of the local branch within 60 days after their plants were struck had efficient working forces employed, and the output to-day is above normal. The molding machine played an important part in this strike, and enabled the founders to score a signal victory. Unskilled labor to a very large extent has replaced the molders formerly employed, and with the added advantage of the machines there has been a material increase in the daily output. Molding machine manufacturers, on the other hand, were afforded opportunities of adapting their appliances to sections that were heretofore considered too intricate for machine work, and the progress thus forced in this direction has been of inestimable value to the foundry trade.

Peace reigned in the building trades and permitted operations to be carried on without interruption. There are indications, however, that excessive demands will be made on building contractors in the spring months, and in view of the high scale now in effect the enforcement of these demands will be opposed. An advance of 10 per cent. in the wages of unskilled labor and turn men employed in the mills of the Illinois Steel Company became effective the first of the year.

Pig Iron.

Monthly average quotations on Northern grades of foundry iron show a spread for the year between high and low points amounting to over \$7 a ton, while Southern No. 2, owing to the depression in May and June, had a range of \$9. An agreement to hold Birmingham brands at a minimum of \$14, at furnace, which could not be maintained, precipitated the only break in the market, and immediately after the dissolution of the pact prices reached their lowest level. The International Harvester Company had previously refused to cover its last half requirements, firm in the belief that quotations were

fictitiously held, and that its contention was right is indicated by the fact that it later succeeded in buying 50,000 tons at prices ranging from \$12.75 to \$13.15, Birmingham. Other heavy purchases made at this time brought about the upward movement, which has continued since without halt.

The cost of making iron at local furnaces on 1907 ore and high priced coke is conservatively placed at close to \$15, the highest point recorded in recent years. This increased cost is, however, of little significance in view of prevailing selling prices, but a decided downward movement would give the Southern producers a big advantage. The cost of charcoal is likewise steadily increasing and the securing of an abundant future supply is a question of considerable concern to Wisconsin and Milwaukee operators.

Although two merchant stacks were scheduled to blow in during the year, difficulties in securing material greatly delayed building operations and their output will not be available for several months. Projected additions to the existing capacity promise a formidable increase in production, but still considered below the natural consumptive increment.

The labor scarcity in the South is a problem that has confronted the furnace operators of that section for several years, although the diversion of immigrants there instead of the West and Northwest promises a satisfactory solution in the near future. Transportation facilities afforded by Southern roads are also inadequate to the demands of that section, and while the recent movement of the cotton crop was at its high large stocks were accumulated in furnace yards owing to the car shortage. Another advance in freight rates amounting to 45 cents a ton becomes effective on February 1, making an increase in the carrying cost of iron from the Birmingham field of 70 cents within a year. Deferred shipments into this territory during November and December developed an active spot market and the International Harvester Company was so hard pressed for material that it was compelled to purchase approximately 15,000 tons of foreign foundry iron for shipment via New Orleans, at prices about \$3 a ton below those prevailing on domestic grades, but \$5 higher than its unshipped contract tonnage.

By-product coking operations in this city and Milwaukee were still further extended by the erection of 40 ovens, and their total combined output to-day amounts to 720,000 tons annually. Notwithstanding the lower cost of production claimed for this process, prices are maintained on a basis of Connellsville grades, and the growing shortage of shipments from this field has forced consumers to the use of the local product. The course of prices during the year, with comparisons for previous years, is shown in the following table:

Average Chicago Prices of Pig Iron, 1906.

Month.	Northern coke No. 2.	Lake Superior charcoal.	Ohio strong soft- eners No. 1.	Southern coke No. 2.
January	\$19.25	\$20.40	\$20.00	\$18.05
February	19.00	20.13	20.00	17.65
March	19.00	19.75	20.00	17.78
April	18.75	19.44	19.68	17.65
May	18.55	19.05	18.85	17.65
June	18.19	19.00	18.55	17.21
July	18.25	19.06	18.80	17.20
August	19.10	19.35	19.45	18.50
September	19.81	20.13	20.18	19.53
October	21.40	21.50	22.00	20.70
November	25.00	24.63	25.10	25.40
December	25.50	26.13	26.00	26.15
Average for the year.	\$20.15	\$20.72	\$20.70	\$19.44%
Average for 1905.....	17.30%	17.99%	18.50%	16.66%
Average for 1904.....	14.04%	15.50	15.04%	13.92%
Average for 1903.....	15.88%	22.13%	21.33	18.31%
Average for 1902.....	20.50	23.50	23.30	20.10
Average for 1901.....	15.00	17.50	16.50	14.60
Average for 1900.....	19.12%	22.00	20.75	18.35
Average for 1899.....	17.65	19.80	19.67	17.75
Average for 1898.....	11.00	11.60	12.00	10.45
Average for 1897.....	10.60	13.00	12.25	10.25
Average for 1896.....	11.70	13.62%	14.50	11.40

Finished Lines.

In the finished lines prices were conservatively held and the advances recorded were proportionately much lower than those made on raw material. Structural

shapes, notwithstanding an advance of \$2 on plates, remained unchanged, and steel bars were marked up only \$2. Sheets are \$6 a ton higher than a year ago, and wire products \$4. Iron bars ruled low in spite of the advancing scrap market, and an effort to maintain an agreement among the Western producers has failed to steady the market. A concession of \$2 a ton to the implement trade on steel bars in April created considerable dissatisfaction among other consumers, and not until their existing contracts had expired did they cover their future requirements. Merchant steel products were moved up with steel bars, but prices are at a low level considering the accumulated tonnage on mill order books. The following table shows the course of prices during the year, with comparisons for previous years:

Average Chicago Base Prices of Finished Iron and Steel, 1906.

Month.	Common bar iron. Cents.	Soft steel bars. Cents.	Structural shapes. Cents.	Smooth machine steel. Cents.	Open hearth spring. Cents.
January	1.81	1.66½	1.86½	1.91½	2.10
February	1.75	1.66½	1.86½	1.91½	2.10
March	1.72½	1.66½	1.86½	1.91½	2.10
April	1.67	1.66½	1.86½	1.91½	2.10
May	1.66½	1.66½	1.86½	1.91½	2.10
June	1.66½	1.66½	1.86½	1.91½	2.10
July	1.66½	1.66½	1.86½	1.91½	2.10
August	1.67	1.66½	1.86½	1.91½	2.10
September	1.71½	1.66½	1.86½	1.91½	2.10
October	1.71½	1.66½	1.86½	1.91½	2.10
November	1.71½	1.71½	1.86½	1.96½	2.15
December	1.76½	1.76½	1.86½	1.96½	2.15
Average for year.	1.71½	1.67%	1.86½	1.92½	2.10%
Average for 1905...	1.64%	1.64%	1.78½	1.89%	2.08%
Average for 1904...	1.41%	1.49%	1.70%	1.74%	1.94%
Average for 1903...	1.64%	1.72	1.75	1.97%	2.57%
Average for 1902...	1.71	1.73½	1.75	2.00	2.55
Average for 1901...	1.58	1.58	1.70	1.96	2.25
Average for 1900...	1.75	1.75	2.00	2.25	2.80
Average for 1899...	1.80	1.90	2.00	2.50	2.85
Average for 1898...	1.05	1.10	1.25	1.55	1.61
Average for 1897...	1.11½	1.13	1.19	1.53	1.66½
Average for 1896...	1.30	1.30	1.40	1.62½	1.87½

Old Material.

Old material in the last half of the year advanced rapidly in sympathy with the upward movement of pig iron, and the high point was reached early in December. A break, however, followed the heavy accumulation of stocks in dealers' yards and prices receded an average of \$1 a ton. Inability to secure shipments of rails from the mills greatly reduced the outcome of relayers from railroad sources, and during the fall months they were selling at \$3 to \$4 a ton above new sections. Railroad offerings of other grades reflected the rapid replacement of rolling stock with modern equipment, and the monthly lists exceeded in volume those of any previous year. The following table shows the monthly course of prices:

Average Chicago Prices of Old Material, 1906.

Month.	Old iron rails. Gross ton.	No. 1 railroad wrought. Net ton.	No. 1 busheling scrap. Net ton.	Heavy cast scrap. Net ton.	Heavy melting scrap. Gross ton.
January	\$23.00	\$17.30	\$12.20	\$14.70	\$14.95
February	21.75	15.88	10.94	13.50	13.63
March	20.75	14.88	10.32	12.75	13.00
April	20.88	14.50	9.56	12.94	13.50
May	21.25	14.50	10.15	13.40	13.70
June	21.25	13.50	9.56	13.50	13.13
July	21.25	13.50	9.00	13.50	13.13
August	21.90	14.50	9.85	14.00	14.10
September	23.50	16.13	11.38	15.88	16.50
October	26.00	17.50	11.40	15.90	16.60
November	28.00	18.00	12.00	17.50	17.50
December	28.00	17.25	12.00	17.50	17.13
Aver. for year.	\$23.04	\$15.62	\$10.69	\$14.55	\$14.74
Average for 1905...	20.18	16.14½	11.11%	13.49½	13.96½
Average for 1904...	16.56%	12.45	8.76½	10.95½	10.72
Average for 1903...	20.28%	16.07	12.05	14.74½	15.50½
Average for 1902...	23.91	19.68%	13.81%	15.03	17.37½
Average for 1901...	19.50	15.00	10.80	11.25	....
Average for 1900...	17.90	15.00	8.00	11.00	....
Average for 1899...	21.00	17.25	10.15	12.40	....
Average for 1898...	12.37%	11.25	6.62½	8.15	....
Average for 1897...	11.67	10.60	6.44	7.25	....
Average for 1896...	13.50	11.20	7.00	8.48	....

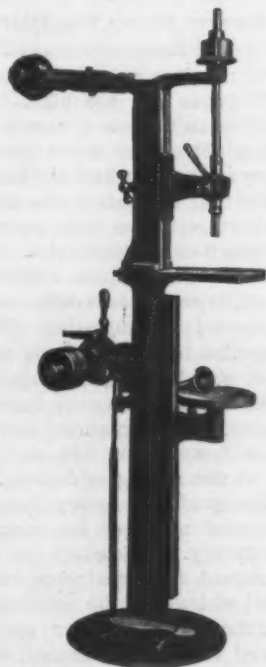
The Prospect for 1907.

A curtailment of building operations, owing to the high cost of material and labor, is anticipated this year,

and the number of new projects now contemplated compares unfavorably with the total under consideration at the close of 1905. Users of cast iron pipe are deferring purchases, owing to the high prices prevailing, and there is a possibility that much public improvement work will be delayed until it can be made at a lower cost. With the mills and furnaces sold up through the first half, and on rails almost through the entire year, there is little opportunity for a break, although pig iron values are fast reaching the danger point. The entire absence of speculative buying throughout the line has established trade on a firmer basis than ever before in similar periods, and is a feature of great strength in behalf of the continuation of the present era of prosperity. Stocks in all lines are depleted, and this replenishment alone involves a tremendous tonnage. While railroad purchases have fallen off temporarily, this does not indicate a policy of retrenchment, as practically all of the ensuing year's requirements are already under contract.

The Robertson Sensitive Drill Punch.

The illustration here produced shows an improved sensitive drill press, built by the Robertson Mfg. Company, Buffalo, N. Y. The machine is capable of drilling to the center of a 12-in. circle and will handle drills up to



A Sensitive Drill Press Built by the Robertson Mfg. Company, Buffalo, N. Y.

$\frac{3}{8}$ in. in diameter. The column is hollow and the head is secured to it, with a closely fitted bearing between the head base and the flange on the top of the column. The round table is mounted on a bracket adjustable to any point on the column by a clamp and ball handle. The square table above it swings to one side, while the round table or the cup center is in use. The countershaft is adjustable to regulate the belt tension, as is also the top pulley bracket. The spindle is steel and runs within a sleeve having a rack on the back meshing with an incased steel pinion by which the spindle is raised and lowered. A spring returns the spindle to its uppermost position when the operating handle connected with the pinion is released.

A very ingenious and simple improvement to this machine is the foot attachment for shifting the belt. While the operator has one hand on the feed lever and the other holding the work, with his foot on the treadle, he may stop the drill instantly if it becomes stuck. This frequently happens and with ordinary drilling machines is apt to result in breaking the drill. The machine is claimed to be substantially constructed throughout and weighs 280 lb.

The Greatest Car and Locomotive Output.

Far in excess of that for any previous year is the total of cars and locomotives built in the United States in 1906. The figures of the *Railroad Gazette*, which include Canada and Mexico, show a total of 240,503 freight and 3187 passenger cars turned out in 1906 by the 38 car building companies in North America. Canada's output was 7059 freight and 83 passenger cars and that of Mexico 203 freight and six passenger cars. The Canadian increase was 230 per cent. over 1905. After easing off in the late spring of 1906 because of high prices and the fact that the works were booked six to eight months ahead, the demand increased in the late summer, and orders are now being given for nine months or a year hence. A considerable number of companies now have more cars on order than they built in the entire year 1906 working at maximum capacity. This indicates an enormous demand for rolling stock. The following table gives the record of cars built in the past eight years, apart from those built by railroads in their own shops, also leaving out electric street or interurban cars. The totals for 1905 and 1906 include Canada:

Year.	Freight.	Passenger.	Total.
1899.....	119,886	1,305	121,191
1900.....	115,631	1,636	117,267
1901.....	136,950	2,055	139,005
1902.....	162,599	1,948	164,547
1903.....	153,195	2,007	155,202
1904.....	60,806	2,144	62,950
1905.....	165,455	2,551	168,006
1906.....	240,503	3,167	243,670

The locomotive builders' record is equally remarkable, the total for the 12 builders in the United States and Canada being 6952, of which 6232 were for domestic use and 720 for export. The total includes 237 electric and 292 compound locomotives, against 140 and 177, respectively, in 1905. The Canadian output was 217. The locomotive building for 15 years (1905 and 1906 including Canada) is shown in the following:

1892.....	2,012	1900.....	3,153
1893.....	2,011	1901.....	3,384
1894.....	695	1902.....	4,070
1895.....	1,101	1903.....	5,152
1896.....	1,175	1904.....	3,441
1897.....	1,251	1905.....	5,491
1898.....	1,875	1906.....	6,952
1899.....	2,493		

Prices have increased considerably. For freight cars the average is put at \$1050, for passenger cars \$8000 and for locomotives \$14,500. The total for the new rolling stock of the year is thus about \$380,000,000, an increase of about 45 per cent. over 1905.

Car and Locomotive Orders Booked in 1906.

The *Railway Age* has compiled statistics of car and locomotive orders placed in 1906. These show a total of 310,805 freight cars, 3402 passenger cars and 5642 locomotives ordered by the railroads of the United States, Canada and Mexico in the year, as compared with 341,315, 3289 and 6265, respectively, in 1905. Deducting Canadian and Mexican orders from shops in the two countries and 28,810 cars ordered by railroads of the United States from their own shops, the number of freight cars ordered from contract shops in the United States in 1906 is found to be 258,866, as against 302,876 in 1905. A total of 142,172, or 46 per cent., of the freight cars ordered in 1906 were specified to be of steel or to have steel underframes. The *Railway Age* estimates that, while the contract shops had a capacity of 175,000 cars in 1905, the present capacity is 200,000 cars, and that of 1907 will be 250,000 cars. It is estimated that two-thirds of the capacity for 1907 is engaged by the orders now in hand.

The Supreme Court of Indiana has reversed a decision of a lower court by which an employee of the Fort Wayne Iron & Steel Company, Fort Wayne, Ind., secured damages of \$2500 because he was scalded by steam turned on a boiler while he was inside cleaning it. The court held that the company was not shown to be to blame for the steam being turned on and that it might have been due to the fault of a fellow workman, for whose acts the company was not liable.

THE PHILADELPHIA IRON TRADE IN 1906.

BY THOMAS HOBSON, PHILADELPHIA.

This is the thirty-first annual review of the Philadelphia iron trade furnished by the writer to *The Iron Age*, during which period the American output of pig iron has increased from a little over 2,000,000 tons per annum to over 25,000,000 tons, the current output being at the rate of over 27,000,000, and promising to be much larger than that during 1907. Even the most enthusiastic optimists appear to have underestimated the potentialities of the iron and steel trades, which are probably still greater than the trade even yet imagines. We have a fair promise that 1907 will not fall far short of 28,000,000 tons, the present output, although over 27,000,000 tons, being below the current requirements of consumers. It is true that the output during the summer months was disappointing, and fell below what had been figured on by competent statisticians, so that there has been a continual shortage during the entire year. At some periods it was less marked than at others and affected some grades to a greater extent than others, but during the last two months everything has been scarce and but for the arrival of a considerable tonnage of foreign material the situation would have been more serious than it has been, as there certainly would not have been enough domestic material to keep consumers at work.

Consumption the Largest on Record.

As regards consumption, however, the past year has undoubtedly been the largest on record, even though prices have advanced much beyond the limits that even the most sanguine people estimated. At the beginning of the year \$20 pig iron was regarded as a possibility, but beyond that figure the trade was very skeptical. Yet in spite of some adverse circumstances prices have gone \$5 a ton beyond the highest limit that was considered probable, and even now there is no certainty that the full limit has been reached.

The real strength of the market is based on the actual need for enormous tonnages of iron and steel. The railroads must make extensive additions to their equipment and to their terminal facilities, all of which is reflected in the extraordinary demand for both raw and finished material, not only by the railroads themselves but those who supply tools and machinery, reaching all the way down to interests that are usually regarded as of comparatively small importance. But while the transportation interests dominate all others as consumers, the country is so prosperous that it would be difficult to find any that are out of line with the general trend. The question of overwhelming importance, however, is in regard to the extent and the length of time that the present favorable conditions will continue. It is a satisfaction to the writer to find that last year's forecast, as well as the one for the year previous, proved to be singularly correct, with the exception that \$20 was suggested as the probable limit for pig iron. That figure, however, was based on the estimate of production made by the American Iron and Steel Association, which until within the past two months fell far short of being realized, and which was undoubtedly the cause of the scarcity of pig iron, as well as for the high prices which now prevail. The new year begins with pig iron at a higher average of value than at any time since 1880, 1881 and 1882. The average for these three years was \$26 per ton, but the total output during that entire period was only 12,000,000 tons, or just about half of the output during 1906. It is, therefore, perfectly clear that not only was there more iron sold the past year than ever before, but the average of prices on so large a tonnage was the highest ever realized, although it is now an absolute certainty that the average for 1907 will be considerably above that of 1906.

Heavy Sales for Future Delivery.

Not less than 12,000,000 to 15,000,000 tons have already been sold at figures averaging \$2 to \$3 more than \$20 per ton, and, as recent sales have been at \$4 to \$5 beyond that figure, and quotations are at the highest in more

than 25 years, business for the last half should increase the 1907 average of prices quite materially. Of course, it is impossible to say whether values can be maintained at this high level for any great length of time or not, but there is certainly no present indication of any reactionary movement, yet in the long run it will be contrary to all experience if there is not some setback, especially if prices get beyond to-day's figures, as some appear to expect them to do.

Those who have had great experience in the business regard the first half of the year with the utmost confidence, but at the pace at which the trade is now moving they are disposed to be ultraconservative for the last half. Leading producers are rather disposed to accept business somewhat freely at to-day's prices, but on the other hand the largest consumers are taking heavy tonnages when they can be arranged on reasonable terms, pretty good evidence that their known requirements will be large and that they regard \$23 to \$24 for No. 2 X foundry for the last half of 1907 as a safe figure, although it seems to be placing a high premium on the future.

Are Present Prices Too High?

The situation is so different from anything heretofore experienced that it requires a good deal of nerve to say that even to-day's prices are too high. Circumstances may arise that will make them look sick before the deliveries are completed, yet on the other hand the requirements of the country are so large and the business actually in hand is so great that consumers are disposed to take no chances of a shortage, hence their purchases to cover for tonnage in proportion to their sales. This of course is perfectly legitimate, but suppose something occurs to cause enforced curtailment of expenditures, which would also mean curtailment in consumption. What then?

There is no question in regard to the need for all the work that is under way, but the element of uncertainty is in regard to the ways and means for carrying it all through. The same feature presented itself a year ago, but the irresistible demand for new equipment carried all before it, and as the spring advanced crop prospects became so good that gradually money became easier and the enormous financial needs of the country were met without serious difficulty. Ultimately the most sanguine anticipations in regard to crops were realized, yet in view of the present stringency the country is confronted with the same difficulty as a year ago. The entire situation is believed to hinge on money, and ultimately money will depend on crops.

The financial situation was at no time really satisfactory during the past year, and in that respect the prospect for 1907 cannot be regarded with complacency, and the experience of 1906 will no doubt be repeated during the earlier portion of 1907—that is to say, hopes of easier conditions as the result of another good crop year may sustain the market for a while, but the first indication of crop failure (if there should be one) would have a depressing influence, and if confirmed by subsequent events there would be reasons to fear a serious reaction during the later months of the year. It is therefore anything but a one-sided market, and they who take the risk of guessing take great risks.

Elements Governing the Price Situation.

There can be no question as to the present favorable conditions, but with a production of pig iron which may be estimated at around 28,000,000 tons during 1907 and prices the highest in more than 25 years there is necessarily more risk than there was a year ago with a production estimated at 25,000,000 tons and prices \$6 to \$7 per ton lower than those of to-day. At the moment, therefore, strong as the market is and bright as prospects are, it might prove to be very premature to take strong ground in regard to any development that may be made in the next two or three months. A month from now the situation will probably begin to assume tone and char-

acter, but what its complexion will be is by no means clear at the present time.

As a reason for the continuance of high prices it is suggested that cost of production has increased to such an extent that the low figures for pig iron recorded during the past several years will never be seen again. This is quite likely as regards the figures of 1894 to 1898, when the low figure was \$11 and the high \$13 for No. 2 foundry. But the experience of 1906 should be enough to make one cautious in predicting what pig iron will do when it once begins to move. Cost of production must of course ultimately control prices, but the ups and downs are always more far reaching than even the best judges expect. For the present the scarcity of pig iron is so great that there is no probability of decreased cost, simply because the demand for raw materials exceeds the supply. Reverse these conditions, however, and it will not be long before costs are reduced. It takes time to do it, but the law of supply and demand is inexorable, and in the long run there is no escape from it. The presumption would be therefore that whatever may be the result in the last half of 1907 the cost of production during the first half will be the highest known for many years.

Range of Prices in 1906.

The advance in the price of pig iron in 1906 appears to have been about \$5 to \$6 per ton. There was little or no deviation in prices in the first six months, due largely to the expectation of increased production, which, however, was not realized until October, while in the summer months there was a most unexpected falling off. This indication of a possible shortage in the later months of the year, combined with the assurance of magnificent crops, started a buying movement early in August which has continued unbroken to this date. This was a perfectly logical outcome, although it is safe to say that not even the brightest minds in the trade anticipated any such prices as are now current.

This leads to a consideration of what may happen the coming year, which we have in some measure already discussed. We stated, and it will be clear to anyone who will look into the matter, that in many respects the situation to-day is precisely what it was a year ago, with the exception of higher prices and higher costs. The demand for money to finance great operations must be met or the work must be scaled down. If there was any certainty that the crops would be equal to those of 1906 money would not be hard to get, but a period of uncertainty in the next three or four months is inevitable. Meanwhile, the enormous issue of new securities and the wild craze of speculation in mining stocks are a standing menace to the money market and likely to remain so until there is some assurance that the crops may be again depended upon to carry us through. Of course no estimate can be formed of their value for months to come, but they are as likely to be large as they are to be small, with the natural hope that they will be the former, but with \$25 pig iron there should be something more to maintain that figure than a mere chance that the crops will be large.

Time to Be Conservative.

It is true that recent purchases of pig iron have been made on the basis of "covering for requirements," but it is safe to say that, if crops are poor, requirements several months hence will not be as large as they are expected to be. This is no time to be pessimistic, but it is eminently desirable to be conservative. Conditions are enough to impart an icy temperature if comparisons are made with former years. Production is the largest on record; prices are the highest since the country returned to a gold basis, and new construction for producing iron and steel is on an unprecedented scale. This will no doubt be fully required in the not distant future, but whether prices can be maintained in the face of a 28,000,000 ton production and a prospective increase beyond that remains to be seen.

Looking back to 1901, which up to that date was by far the greatest year on record, it will be found that production was less than 16,000,000 tons while the average of prices was not over \$15. The year following showed an increased production amounting to 2,000,000 tons and an advance in prices of about \$6.50 per ton, but the pace was too rapid, and while 1903 showed a somewhat larger

production, prices declined \$2 per ton. The year following showed a further loss of 1,500,000 tons in production and a loss in price of \$4 per ton, bringing the 1904 figures to \$15, making them about even with those ruling during 1901. During 1905 prices improved to an average of about \$17.25, and during the first six months of 1906 they advanced \$1 more. The gain in the last half was easily another \$6 per ton, due largely to the unexpected decrease in production during the summer months and the general conviction that the assurance of magnificent crops would inevitably result in an almost immediate expansion in the demand for all kinds of iron and steel. This of course is ancient history, but it is interesting to note the influences which developed the conditions which now exist, as well as their possible bearing on business during the coming year.

A fair summary of the situation would be that the year begins with production the largest on record and prices the highest since 1881. The difference in the situation, however, becomes the more striking by figuring the money value of the entire production of pig iron in 1881 with that of 1906, the former in round numbers being \$100,000,000, while that of the past year was over \$500,000,000, which of itself shows the necessity for vastly increased demands on the money market. The following figures show the average prices of pig iron for each month in 1906, based on deliveries in consumers' yards, Philadelphia and adjoining territory.

	No. 2 X foundry.	Standard gray forge.	Basic.
January 1.....	\$18.50	\$16.75	\$17.90
February 1.....	18.50	17.00	18.00
March 1.....	18.50	16.75	18.00
April 1.....	18.25	16.75	17.90
May 1.....	18.75	16.50	18.00
June 1.....	18.50	16.25	17.75
July 1.....	18.25	16.10	17.60
August 1.....	18.50	16.50	17.85
September 1.....	20.25	17.75	18.50
October 1.....	21.25	18.25	19.25
November 1.....	22.50	20.00	20.25
December 1.....	24.75	21.75	22.50
December 31.....	25.00	22.50	24.00

Foreign Pig Iron.

A year ago there was very little idea that foreign pig iron would be drawn upon to supplement our requirements during 1906, but as the scarcity of the domestic article became so apparent there was no alternative but to go abroad to supplement our needs as far as possible. Shipments in large volume did not begin until November, when a leading house acquired from 15 to 20 cargoes, equal to 80,000 to 100,000 tons. The great bulk of this iron was Middlesbrough No. 3, which has been sold at from \$21.50 to \$22.75, on dock, Philadelphia. Some shipments were also made to Boston and New York by the same house, which for the two ports named were mostly Scotch iron, which has been disposed of at \$24 to \$25. Large tonnages of both Middlesbrough and Scotch iron have been bought for Western account, some 8 or 10 cargoes having already been shipped via New Orleans. The total tonnage expected in the United States from these two sources of supply will probably not exceed 200,000. It is a question whether further purchases will be made, depending entirely upon the course of events during the next five or six weeks.

Steel Billets.

The output of billets in this district has been larger than in any previous year, although the increase has been less important than in most other lines. The new Roebling plant at Kinkora, N. J., will make a considerable tonnage, but for the present it is expected that it will be consumed by the parent concern at Trenton, so that while it will ease the market to some extent it will not be a competitor for outside business. The course of prices during the first six months did not vary at any time more than \$1 per ton, \$29 to \$30 for ordinary rolling billets being the range from January to August, and from September there has been a gradual advance to \$34, which is a fair average figure at this time.

Plates.

The output of plates in eastern Pennsylvania in 1906 was the largest on record. The combined capacity of the

mills in this district is estimated at 700,000 to 750,000 tons per annum, and the actual output will come something close to those figures. Prices have been quite uniform, having only been changed twice in the entire year. The first change was to 1.93½ cents, Philadelphia, in November and the last was to 2.03½ cents in December. A great portion of the year's work was done at 1.73½ cents, which was really too low considering the high cost of material, but as there seemed to be no prospect of easier conditions manufacturers were finally compelled to advance their quotations as stated, making the present price 2.03½ cents for ordinary ¼-in. plates for deliveries in this district. A considerable tonnage of the output, however, has gone West, largely to the lake shipyards and to boiler shops in Ohio and northern New York. Boiler plates are a specialty with the Eastern mills and are distributed over a wide area, the Southern States being among the most important consumers.

Structural Material.

The tonnage sold by Eastern mills during the year is unquestionably the largest on record. The old mills have been enlarging their capacity from time to time, and the Eastern Steel Company's plant at Pottsville, Pa., now fully completed, is turning out 100,000 to 125,000 tons per annum. The Bethlehem Steel Company is putting up an enormous plant, which is expected to cost upward of \$10,000,000. This, however, is for special work, taking in large sizes mostly for railroad and bridge work, and will probably not interfere greatly with other Eastern mills, although it will be one of the leading mills, if not the very foremost mill, in the country on that class of work. Prices have been uniform at 1.83½ to 2 cents during the entire year, due in large measure to the increased capacity, which is estimated at 250,000 to 300,000 tons greater than in any former year, and even that will be largely increased in 1907. The Bethlehem plant will probably be ready for operation in the summer or at latest the early fall.

Bars.

The first half of 1906 was a fairly prosperous time for the bar mills, although prices were inclined to slide off during that period. The opening price was 1.83½ cents, Philadelphia, but by the end of February they were down to 1.73½ cents and in May to 1.68½ cents, at which figure they were fairly maintained during the summer months, although some business was taken on at less than 1.60 cents. The business carried over from 1905 was at good prices, however, and as scrap and other material were not dear the result of the first half year's business was at least fairly remunerative. The last half was precisely the reverse of the first half, having low priced orders and high priced raw materials, so that 1906 as a whole will not be noteworthy for profits to the manufacturers of bar iron, and although prices are on a higher level now they are much more than offset by higher costs of coal, coke, scrap, pig iron and labor. The immediate outlook is good enough as regards volume of business, but selling prices are too low in proportion to cost, so that it will be a most difficult matter to work off back orders with any reasonable margin for profit.

Old Material.

The market for old material has become so speculative that it is regarded as more or less of a gamble. Nearly half the time dealers are willing to pay more than consumers will pay, but as they have to a large extent operated on a rising market the result in most cases has been highly satisfactory. There were times in the earlier portion of the year when prices dropped off rather seriously, but holders had confidence in the future, which up to this date has been amply vindicated.

The situation in this territory as regards the future is of peculiar interest, owing to the increase in the number of consumers as well as in the greater tonnage required by those who have been in the business for some time, and it is hard to see how it will work out. It will certainly distribute the demand over a larger area and will no longer be confined to a few large mills. The Staten Island plant will be a heavy consumer, also the plant at Kinkora, N. J., while in northern New York large tonnages will be required. The Central West may also draw largely from sources which have hitherto been re-

garded as tributary to eastern Pennsylvania, so that the question of steel scrap will be one of commanding importance in the near future. Rolling mill scrap may sympathize to some extent, but it will be largely governed by the same conditions as in the past, while steel scrap will be a very competitive article. The range of prices during the year has been as follows, closing at the very outside figures:

	Jan. 1.	Feb. 1.	Mar. 1.	Apr. 1.
No. 1 steel scrap.....	\$18.00	\$17.25	\$16.25	\$16.75
Old iron rails.....	24.50	24.00	22.50	21.75
Old car wheels.....	19.00	18.75	18.75	18.75
Choice scrap, R. R. No. 1 wrought.....	21.75	21.00	19.25	20.00
Machinery scrap.....	16.25	16.25	15.75	15.75
Wrought turnings.....	14.75	14.25	13.75	14.00
Cast borings.....	10.75	10.75	10.25	10.25
Stove plate.....	13.50	13.25	12.25	12.75
Wrought iron pipe.....	16.75	15.75	14.75	14.75
	May 1.	June 1.	July 1.	Aug. 1.
No. 1 steel scrap.....	\$17.00	\$16.00	\$15.75	\$16.75
Old iron rails.....	21.75	21.25	20.25	21.50
Old car wheels.....	16.75	17.00	17.00	16.75
Choice scrap, R. R. No. 1 wrought.....	20.75	18.50	17.50	19.25
Machinery scrap.....	15.75	15.75	15.25	16.25
Wrought turnings.....	14.25	13.00	12.25	12.25
Cast borings.....	10.25	9.75	9.50	10.00
Stove plate.....	12.75	11.75	11.25	11.75
Wrought iron pipe.....	15.50	13.50	12.75	13.75
	Sept. 1.	Oct. 1.	Nov. 1.	Dec. 1.
No. 1 steel scrap.....	\$18.00	\$18.50	\$18.25	\$19.75
Old iron rails.....	24.50	25.50	26.00	27.50
Old car wheels.....	17.75	21.00	22.00	23.25
Choice scrap, R. R. No. 1 wrought.....	21.25	22.75	22.25	23.50
Machinery scrap.....	17.25	18.50	18.75	20.25
Wrought turnings.....	13.75	14.50	14.50	16.00
Cast borings.....	11.25	11.75	11.25	13.25
Stove plate.....	13.50	14.25	13.75	17.00
Wrought iron pipe.....	15.75	16.50	16.25	17.25

The Consolidated Sheet Metal Works.—A company bearing this name has been incorporated at Milwaukee, Wis., with a capital stock of \$50,000 and on January 1 began active business, occupying a new factory which has been erected for it purposely during the fall months at 661-673 Hubbard street. The new company brings together several prominent sheet metal manufacturers who have for years been conducting extensive business operations in Milwaukee. The incorporators are John and Fred Bogenberger, who have constituted the firm of F. Bogenberger & Bro., 267 Sixth street; Paul L. Biersach, formerly with the Biersach & Niedermeyer Company, 220 Fifth street, and William Hammann, who has for several years conducted a plant at 752 Fourth street. The new building occupied by the company is 100 x 150 ft., one story and basement, of fireproof construction, brick and iron, with wire glass windows and skylights. This consolidated company will be the largest contracting sheet metal concern in the Northwest outside of Chicago. Much of the machinery from the old plants of F. Bogenberger & Bro. and Wm. Hammann will be removed to the new factory, and extensive orders have been placed for power machinery with the Geo. A. Ohi Company, Newark, N. J. With the installation of the new machinery the company will be prepared to turn out work in 24 hr. that has heretofore consumed from four to five days. Mr. Bogenberger and Mr. Biersach will be remembered as very active in the organization of the National Association of Master Sheet Metal Workers at Philadelphia. Both have been in business in Milwaukee for many years and have a large established clientele. The new company will make a specialty of fireproof windows and skylights and starts with a large line of orders for important work in Milwaukee and various points throughout the Northwest.

The first International Exposition of Safety Devices will be held in the American Museum of Natural History, New York, for two weeks, beginning January 29, 1907, and space is now being assigned for the various exhibitors by W. H. Tolman, director, who can be addressed for space at 287 Fourth avenue, New York. The exhibits will include all sorts of devices for safeguarding life and limb, especially such devices as are used on wood and metal working machinery, stamping, grinding and polishing machines; safeguards for boilers, elevators, windlasses, cranes, lamps and explosives, and the like.

A Prosperous Year for Mexico.

DURANGO, December 27, 1906.—The first full year during which the business affairs of Mexico have been carried on under what is practically a gold standard system of finance is drawing to a close. A review of the 12 months' operations affords ample cause for satisfaction and gives eloquent testimony to the wisdom of the Government in making the important fiscal reform.

In introducing a bill for appropriations for public works a few days ago Minister Limantour, in an address to the Deputies in Congress, announced that the financial operations of the last fiscal year had resulted in a net surplus of \$20,000,000, which makes the reserve in the federal treasury \$72,000,000. From a standpoint of general business the change in the monetary system has also proved most beneficial. Activity in wholesale and retail lines has ruled steadily throughout the year, no check having been experienced since its favorable opening. The old annoyances consequent upon the variations of exchange are now mere memories, and merchants, importers and investing foreign capitalists can do their business upon a satisfactory and stable basis. There has been a large increase in the volume of incoming capital for investment, with a noteworthy expansion of commerce with outside nations.

Prosperity has attended the mining and smelting industries, the steady and sustained advance in the price of both bar silver and copper during the last half of the year having materially contributed to the benefit of these activities. The effects, however, of the improved monetary conditions have been more visible in the operations of the transportation companies than in any other line of business. The railroad companies, the greatest sufferers under the old system of an unstable *peso*, appear to have taken a new lease of life. They have been at times during the year almost overwhelmed with traffic. The amount of money expended by them for new rolling stock to meet the demands of this era of prosperity has been very large, while the increase in gross and net earnings of the principal systems has been of a most satisfactory character, enabling one or two of the companies to astonish stockholders by paying dividends.

Construction work on new railroad extensions has been energetically pushed, though somewhat impeded by scarcity of labor and an unusually heavy rainfall. The Mexican Central, notwithstanding these drawbacks, has made good progress on its extension to the Pacific Coast. The end of the year finds the Government's important railroad undertaking, the Tehuantepec National, completed and ready for business. This line, which has cost the nation so many sacrifices and has been in the hands of the constructors for so long a time, has finally reached the stage, as was predicted a year ago, "where it must become a factor in the problem of interoceanic transportation." Although the work at the terminal ports has not been completed it has reached a point which will enable the company to take proper care of all freight offering and to load and unload vessels with every dispatch. Arrangements have been made with a number of steamship companies who will inaugurate a service in connection with the road on the first of the new year. That this short cut to the Orient will prove to be both profitable and popular and that the volume of freight moved by the road will rapidly increase when its time saving benefits are properly known by exporters cannot be doubted.

Reference has already been made to the large amount of foreign capital which has been invested in varied lines during the year. While it is difficult to estimate this total it may be of interest to note that London journals assert that in the eight months from January to August British capital aggregating £2,000,000 has been invested in new companies for operation in this country, while 100,000,000 francs is the amount said by French authorities to represent the investments made by people of that nationality, with whom Mexico is yearly increasing in favor as a field for the profitable employment of capital. Many large mines and a number of important haciendas have passed to American owners during the

year, but any statement as to the total of American investments in the absence of trustworthy data would be simply guesswork. It has undoubtedly been large.

There have been no new developments of interest in the domestic iron and steel trade during the year. No new manufacturing plants of this class have been projected or started. The works at Monterey have been kept busy throughout the year. The iron and steel plant near Durango remains idle.

The demand has been brisk all the year for iron and steel products, especially for structural material and for mining machinery, agricultural implements, &c.

The year has been notable as bringing to a close negotiations long in progress, whereby the Mexican Government has become the preponderant factor in the ownership of the Mexican Central Railway system—a most important event. A well informed journal gives the following details in relation to the transaction:

By the terms of the contract the Government secures absolute control of the Central, the National, the International, the Interoceanic and the Hidalgo & Northeastern, which will be merged into one great railroad system. The Government also comes into control of the Texas-Mexican, a railroad in Texas which is owned by the National. The mileage of the system will, with the extensions which are rapidly nearing completion, aggregate approximately 10,000. The Tehuantepec National and the Vera Cruz & Pacific, two other railroads controlled by the Government, will continue to be operated as independent companies.

All the signs indicate a continuance of industrial activity, while the people, native and foreign, having confidence in the wisdom of the Government, look forward with cheerfulness to the dawning year.

J. J. D.

The Federal Blueprinting Machine.—All rights in the Federal blueprinting machine, patented in 1902 and 1903 and formerly manufactured by the Spaulding Print Paper Company, Incorporated, Boston, Mass., have been acquired by the Kenffel & Esser Company, New York. For the benefit of those unacquainted with the machine, it may be briefly stated that it is of the horizontal revolving drum type, with printing light furnished by a row of electric arc lights inclosed in a reflecting case which concentrates the rays upon about one-quarter of the drum surface. The drum is a wooden shell supported on light iron wheels and mounted in roller bearings. It is revolved by a ¼-hp. electric motor. No glass is used in the construction of the machine. The tracing during printing is held in contact with the paper by a travelling strip of tracing cloth, known as the apron, which encircles a little more than half of the drum. This is unreel from a roller above the drum and is reeled upon another below it. After the strip has reached its end it is rewound upon the upper roller by multiplying gearing hand operated. The speed of travel of the machine which determines the length of exposure is controlled by a patent speed controller. The work is fed and discharged on the same side of the machine. Three sizes of the machines are made, having width capacities of 30, 42 and 54 in., and 4, 6 and 8 lamps each, respectively. Motors and lamps for either direct or alternating current are furnished.

Railroad Receiverships and Foreclosures in 1906.—The *Railroad Gazette's* statistics of railroad receiverships of 1906 show six roads with a total mileage of but 204, bonds of \$21,142,000 and stock of \$34,095,000. The principal receivership was that of the Chicago Terminal Transfer Company, with \$15,140,000 of bonds, \$30,000,000 of stock and 84 miles of track. There were nine foreclosures, involving 254 miles, \$5,345,135 of bonds and \$4,442,300 of stock. With the exception of the St. Louis & North Arkansas Railroad, 128 miles, the important foreclosures of the year were only the formalities of finally taking over smaller roads by stronger systems.

Reports connecting the Bethlehem Steel Company, South Bethlehem, Pa., with the purchase of a large acreage near Hammond, Ind., have been officially denied. It is stated that there is absolutely no foundation for the report which has been disseminated by Western dailies.

THE IRON AGE

1855-1907.

New York, Thursday, January 3, 1907.

DAVID WILLIAMS COMPANY,	PUBLISHER
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A Monumental Year in Iron and Steel.

The American iron industry has done such marvels in exceeding itself that it seems no longer possible to excite wonder by new records or to stir the imagination by predictions of greater things. The year just ended stands at the head of a procession of wonderful years. It was greatest in the production of iron ore, of pig iron and of all forms of finished iron and steel. It was greatest also in the profit realized by iron and steel manufacturers and in the net return to wage earners in all departments of the industry. No other year of abounding prosperity in the American iron trade has ended with a less overhanging threat of a reckoning for excesses growing out of good times. No year can be recalled that at its close showed so great a tonnage on manufacturers' books at prices representing the climax of an upward movement prolonged over months. It is a fact of no little weight, moreover, that the present unparalleled condition in the iron trade, as in all industry, exists in spite of questioning, of an almost microscopic search for advance signs of reaction, and of the fear constantly expressed that the sky was too near cloudless to remain so long. The argument, based on a canvass of the general financial and industrial and domestic and foreign situations, is too familiar to be repeated in this connection.

It is testimony to the comprehensive planning of the leaders of the iron trade that the furnaces and mills were able to respond as well as they did to the tremendous demands upon them in the past year. It is the habit of the iron trade to begin large additions to capacity in times of high prices and of unsatisfied demand for its products, and the work of this character begun in 1905 proved the saving of the situation last year from even a worse embargo than consumers in some lines have had to endure. The forehanded policy in new construction which the large consolidations, with their vast financial resources, are now able to pursue, stands out by contrast with the fact that pig iron, the one department of the trade in which the individual initiative of the relatively smaller companies is depended on, showed last year the greatest disparity between supply and demand. Merchant blast furnace capacity still lags behind demand. It is noteworthy, moreover, that of the new furnaces now under construction, or planned, representing an annual capacity of 4,100,000 tons—leaving out the second group of four furnaces for Gary, Ill., as belonging to 1908—merchant furnaces make up only 15 per cent. of the total. The large steel interests, notably the United States Steel Corporation, now make their plans for new plant, not with reference to the exigencies of a particular year, but with a view to the expansion that is to be expected two years, three years, five years hence. And in the matter of raw material, 20, 30 or 40 years is now considered not too long a look ahead. It was such a long look into the future that brought into the record of the iron trade for 1906 its most momentous event—the taking up by the United States Steel Corporation of the

largest body of Lake Superior iron ore not controlled by steel making interests. As was said in these columns at the time, the closing of the Hill transaction means the marking up of iron ore values in the United States all along the line. Interesting and important as are the other developments, as detailed on other pages of this issue, this is the most significant and far reaching fact in iron trade history for 1906.

This general enhancement of the cost of iron ore which may hereafter place 1906 in the position of an epochal year, bids fair to lead to developments of which more will be heard in the next decade. The splendid advance in iron and steel tonnage records in the past 15 or 20 years makes them a conspicuous period. It has been the period of mechanical triumphs in the industry. Ore and coal handling machinery and all forms of conveying equipment, including the furnace skip hoist, the traveling crane and the chain conveyor, have been brought to a high state of efficiency, while continuous heating furnaces, continuous mills and modern tables, manipulators and cooling beds have made possible mill records which 20 years ago would have seemed fabulous. But for these contributions of the mechanical engineer and their more recent perfection such an achievement as our iron mines, blast furnaces, steel works and rolling mills have made in the past year would have been far beyond reach.

It need not be assumed that the improvements in this direction have reached their limit. The mechanical treatment of ore and coal will yet be a fruitful field of operation. But it is natural to expect, in view of the enhancement of raw material values which 1906 has brought upon the trade, that the next important contribution to the solution of the steel maker's problem will be made by the metallurgist and chemist. Ways must be found of making steel go further and last longer. Inexpensive additions to melting furnace mixtures must be found that will make it possible for a light section of steel to carry the same weight now carried by a heavier, and the life of the steel must be prolonged by adding to its resistance to corrosion. These are among the inevitable alternatives of the pre-emption of our iron ore supply and its appreciation in value.

Other methods of counteracting the same upward movement in fundamental values will be found in the more general introduction of by-product economies. Fuel and ore will both be made to contribute to the cheapening of power. Dry blast equipment, the retort coke oven and the blast-furnace-gas engine will take a place among the necessary economies rather than the optional adjuncts of iron and steel manufacture.

It is no new thought that by-product utilization must one day command more attention from American iron masters; but it is worth considering whether the foremost feature in the record of 1906 has not set forward this movement much beyond the general reckoning.

The Problem of Railroad Finance.

In raising the question whether the turn has come in the continued expansion in railroad earnings, which has been the great feature of the country's financial record of the past 10 years, the *Financial Chronicle* directs attention to a critical point in the discussion of the industrial outlook. On the face of things it is surprising to find, simultaneously with late reports of increasingly acute transportation troubles due to the railroads having more freight offered than they are able to handle promptly, that increases in earnings are rarer and smaller and that even decreases are shown in some monthly

comparisons with last year. The *Chronicle's* figures for November indicated that 21 roads out of 69, or nearly one-third of those reporting, earned less in that month than in the corresponding month of 1905. The falling off was not great in any case; but with more rolling stock and better terminals and with a greater business than that of a year ago it is a matter to be inquired into that increases in net earnings should disappear.

The fact that the grain movement has fallen behind last year has been cited, but that is scarcely to the point in a time when to take on more freight of one kind the railroads would simply have to cut down the amount they are carrying of other descriptions. One view taken is that the voluntary reductions in rates by the railroads have been more numerous in recent months than in any like period in previous years. Whether these reductions have been made to forestall action by the Interstate Commerce Commission under the new law, and on the theory that voluntary reductions might save more radical compulsory reductions, does not appear. So far as the iron trade is concerned recent announcements indicate that the railroads would make it compensate in some measure for the lowering of rates in other directions. But of the fact of numerous reductions in rates there is no doubt. President Roosevelt's message cited the notices of 5000 reduced tariffs received by the Interstate Commerce Commission two days before the new rate bill went into effect as an example of an extraordinary movement in this direction. It would be necessary to know what proportion of the traffic of the country is affected by these reductions to judge whether the aggregate is as significant as might be inferred from a merely numerical statement.

It illustrates how rapidly public attention shifts from one phase of industrial conditions to another to have emphasis put just now on decreased railroad earnings, whereas not many weeks ago financial and speculative circles were fairly stunned by the size of the dividend declared by one system, while in the latter half of 1906 came a procession of dividend increases, all justified on the ground that they "reflected real prosperity." Following these impressive demonstrations of the accumulating profits of the railroads came advances in wages, some voluntary and others the result of demands. There was little room for discussion over these. The managements of railroads whose stocks were being bulled preliminary to new bond flotations had stated the case even better than the labor unions could have put it.

Then almost concurrently the announcements came of new stock authorizations, forming a climax to the list of new stock and bond issues the year had brought forth. Within a single week, the third week in December, the directors of four Western railroads—the Northern Pacific, Great Northern, St. Paul and Atchison—voted \$353,000,000 of new stock, bringing the authorized capital of the four up to \$1,073,000,000.

Some pessimistic utterances have represented that the market for steel rails in recent weeks has indicated a halt in the purchases of the railroads, and this has been commented on as a significant feature. The rails now booked for 1907 delivery may be estimated at 200,000 tons in excess of the 2,000,000 tons reported a year ago as on the books for delivery in 1906. In the first three months of 1906 there were heavy additional purchases. If the corresponding months in 1907 should show a marked shrinkage it might be inferred that the total for this year would not reach that for 1906. But unless the important extensions already planned and in a number of cases well under way are held up there is

no present reason for saying that the record of rail sales in the early part of 1906 may not be equaled or even exceeded.

Referring to car orders, the books of the leading car works now show nearly a year's business ahead. A similar statement was made one year ago, but there is the difference that to-day much new car business is coming forward, whereas a year ago, on the testimony of leading steel car builders, a lull came in the placing of contracts. Recently railroads inquiring for steel cars have been told that deliveries could not be made before 1908.

So it would seem that while the closest students of the situation are on the *qui vive* for signs of lessening abundance in railroad purchases those who claim to see that condition already here have not taken the real measure of the facts. Yet it is perfectly in order to inquire how the railroads can expect to pay dividends at the increased rates of 1906 on vastly increased capital, pay wages on a basis representing tens of millions more in 1907 than in 1906, pay interest on the new issues of bonds made in 1906, continue to buy at prosperity prices on the scale of the past 18 months, and at the same time reduce transportation rates in the way plainly contemplated in the rate fixing law of 1906. The programme attempts too much. If years of profits far beyond the dreams of a decade ago are not only to bring no reduction in railroad indebtedness, but, on the contrary, stupendous additions to such indebtedness, what shall be looked for in the years that in comparison with 1906 will be called lean?

Employers' Liability for Accidents.

The industrial community, both employers and employees, may watch for possibly vital results from that section of President Roosevelt's message to Congress in which he refers to what he considers the need of a stronger employers' liability act, that would place the entire risk of a trade upon the employer. The recommendation, if carried out, would doubtless take some form of the workmen's compensation system as practiced in Great Britain and some of the Continental countries; it is difficult to see how else the result could be accomplished. This system eliminates the entire question of negligence, both on the part of the employee and of the employer and his agents, and provides that whenever a workman meets with an accident he or his heirs shall receive a certain sum of money, based on his earnings. The message speaks as follows with regard to the unavoidability of a certain number of accidents:

It is a great social injustice to compel the employee, or rather the family of the killed or disabled victim, to bear the entire burden of such an inevitable sacrifice. In other words, society shirks its duty by laying the whole cost on the victim, whereas the injury comes from what may be called the legitimate risks of the trade. Compensation for accidents or deaths due in any line of industry to the actual conditions under which that industry is carried on should be paid by that portion of the community for the benefit of which the industry is carried on; that is, by those who profit by the industry. If the entire trade risk is placed upon the employer he will promptly and properly add it to the legitimate cost of production and assess it proportionately upon the consumers of his commodity. It is therefore clear to my mind that the law should place this entire "risk of a trade" upon the employer. Neither the Federal law, nor, as far as I am informed, the State laws dealing with the question of employers' liability, are sufficiently thoroughgoing.

If such a plan is to be adopted in this country several important considerations must be taken into account if it is to be a just measure. The arbitrary provisions which would govern the amount of compensation must be carefully fixed, and if the employee is to receive the benefit of compensation for all classes of accident, regardless of his own negligence, then the employer should

be assured by law that he cannot be sued under employers' liability acts, at the option of the workman. It seems a perfectly fair proposition that if the employer must pay for the results of an employee's negligence, or, to take the President's view of it, if the consumer is to pay for such negligence, then the employer, and after him the consumer, should be relieved of the onus of extra payment when the negligence is chargeable to the employer.

In England the hardship to the employer has not been so much that he operates under the compensation act, but that an employee has been permitted to sue under the employers' liability act when he has chosen to do so, which means that the well defined limit of damages fixed by the compensation act is occasionally replaced by a verdict for a larger amount awarded by a sympathetic jury, sometimes in spite of the facts as set forth in evidence. Although a court has the power to set aside a verdict on the ground of excessive damages, or because it is grossly against the evidence, nevertheless the employers' liability law in its every day working is too frequently an injustice to the employer. It may also be truthfully stated that occasionally the employer escapes the payment of just damages, perhaps because his case is better handled than that of the suitor, but no one will dispute that, taking the average, the workman gets by far the best of it in such cases. With a workman's compensation act replacing absolutely all other statutes governing liability, justice would more certainly be secured, without contention as to where the blame of an accident may rest.

With this provision well defined the employer would possibly be disposed to accept the change, provided that the new law did not put compensation at figures above what might be considered equitable. To determine the figures would have to be the work of a carefully conducted inquiry, which would look into the operations of such laws in other countries and their practical application to conditions as they exist in the United States. In a general way the compensation is based upon the wage received by the injured person and the length of time he is incapacitated from his work; or, if his injuries permanently disable him, a certain lump sum is paid him, also based upon his wage; or, if he dies, his family is similarly provided for. A tribunal has power to fix damages and, where partial disablement results, to determine what is an equitable settlement. But all this is done under well defined laws, so that disputes are simplified far beyond what can be possible under any existing employers' liability law. In examining into the subject the vital point already alluded to must be kept in sight—namely, the necessity of equity in giving to the employer no advantage over the employee and the employee no advantage over the employer. If the latter cannot choose between two methods of procedure in determining an amount of damages, then the employee should not have that option. The amount of compensation under the act should be such as to render this unnecessary.

Presuming that a bill will be presented to Congress in pursuance of the President's recommendation it would be a worthy task for the Government to make a careful, detailed investigation of the whole subject, and from the results frame an act which would apply as far as Federal power can go, and which within its entire field of operation would completely supplant all previously existing employers' liability laws. The States might later act for themselves in the matter.

The President speaks of reckoning the increased burden from payment of damages for accidents into the

general cost of the product and letting the public stand it. It does not necessarily follow that the cost would be greater on this account, if the act were framed as a complete substitute for existing laws. While some employees would be awarded damages who had not previously been entitled to them, others would get less, because the amount would not be fixed by a jury. It should also be remembered that most industrial establishments actually operate a sort of workmen's compensation of their own, though not by rule. In cases where men are injured through their own negligence, where the employer is in no sense responsible for a cent of damages, surgeons' bills are paid and when necessary families are assisted. The places of injured workmen are kept open for them, if there is promise that they will be able to return to their old work, or other places are provided. It is not always that philanthropy is the only consideration in this kind of treatment. It has sometimes become necessary, in localities rich in "ambulance chasing" lawyers, to forestall the advice of the attorney who seeks to do business on the basis of a contingent fee. The combination of this sort of man and a jury predisposed in favor of the poor man suffering from injury is frequently a bad one for the employer. But the generous sentiment is the chief element in the local workmen's compensation system of the industrial establishment. Its cost counts up in a year and should be reckoned in with expenses and losses in employers' liability suits or with premiums on employers' liability insurance. In other words, an equitable workmen's compensation act would probably not materially increase the expense to manufacturers, when every element of the present system is taken into account, and the change might bring freedom from an enormous amount of annoyance.

Notable Boiler Tests.—Two rather interesting tests of boilers built by the Parker Boiler Company, Philadelphia, Pa., have recently been reported by Jay M. Whitham, consulting engineer of Philadelphia. The first of these was made on a 536 hp. boiler installed at the power house of the Philadelphia Rapid Transit Company. The boiler has a total heating surface of 5362 sq. ft., a total grate surface of 126.7 sq. ft. and is provided with superheaters and ordinary grates. The test lasted 12 hr., the following being the items of most importance from the data: Steam pressure leaving the superheater, 140.9 lb.; draft in the furnace, 0.45 in.; temperature of the steam leaving the superheater, 471.5 degrees F.; temperature of escaping gases, 349 degrees F.; temperature of feed water, 77.8 degrees F. Buckwheat anthracite coal was used, having a percentage of moisture of 5.34 per cent. and of ash and refuse of 26.2 per cent. The steam was superheated 110.4 degrees F. The equivalent evaporation from and at 212 degrees F. per pound of dry combustible was 11.47 lb.; the dry coal burned per hour per square foot of grate surface 22.3 lb. and the steam produced in excess of the builders' rating was 29.5 per cent. In the second test a 325-hp. Parker boiler equipped with balanced draft was tested, using a poor quality of semi-bituminous coal. The test lasted 10 hr. The heating surface of the boiler is 3250 sq. ft. and grate surface 54 sq. ft. The following is the most important data taken from the test: Steam pressure, 102.9 lb.; draft over the fire, 0.02 in.; blast in the ash pit, 0.67 in. The temperature of the feed water, 82 degrees F.; temperature of the flue gases, 487 degrees F.; moisture in the coal 2.2 per cent.; ash and refuse, 13.5 per cent. The equivalent evaporation from and at 212 degrees F. per pound of combustible was 10.56 lb. The boiler developed 381.7 hp., or an excess of 17.4 per cent. over the builders' rating.

The National Cash Register Company, Dayton, Ohio, has increased its common stock from \$4,000,000 to \$9,000,000, which, with the \$1,000,000 of preferred stock, brings the capital up to \$10,000,000.

Customs Decisions.

Paper Engine Models.

Paper engine models, according to a ruling made by the Board of United States General Appraisers December 29, are not chargeable with duty as manufacturers of paper at the rate of 35 per cent. O. G. Hempstead & Son, Philadelphia, insisted that the models should be allowed to enter as printed matter at 25 per cent., or at other specified rates. General Appraiser Fischer, who writes the decision for the customs tribunal, sustains the contention that the merchandise should be permitted to come in at 25 per cent.

Platinum Iridium and Rhodium Wire.

A protest by Edward Brown & Son, Philadelphia, regarding the rate of duty applicable to platinum iridium wire and platinum rhodium wire, has been sustained by the General Board. Duty was assessed at the rate of 45 per cent. under the tariff provision for manufactures of metal, while the importing interests maintained that the goods should be admitted free as platinum wire. In sustaining the contention the decision says, in part:

The testimony shows that the wire is nine-tenths platinum and that it is used in the same general way and for practically the same purposes as platinum wire, the varying temperatures to which the wire is exposed in chemical experiments being the reason for the admixture of iridium and rhodium. We are of the opinion that the presence in the wire of small quantities of these metals, which are, chemically, platinum metals, should not affect their status as platinum for tariff purposes. The protest is sustained and the decision of the collector reversed.

Iron Sand.

A protest filed by the Central Vermont Railway Company against the return made by the collector of customs at Burlington, Vt., dealing with the classification of iron sand, has been decided adversely to the importers. Duty was assessed on the merchandise at 45 per cent., it being the contention of the company that the sand should be permitted to enter on the basis of 5-10 cent per pound. Although duly notified the Central Vermont Company failed to appear at the time set for the hearing of the case. As a result, and in conformity with the ruling of the United States Circuit Court, the board denies the contention of the forwarders.

Flexible Iron Tubing.

The Pacific Coast Rubber Company has been defeated in an attempt to obtain lower duty on importations of flexible iron tubing. The merchandise was assessed by the customs officials at Port Townsend, Wash., at the rate of 35 per cent., it being the contention of the importers that the tubing should be admitted at 2 cents per pound. The importers failed to substantiate their claim when called upon to do so.

Scissors Blades.

Scissors blades unfinished and in the rough state will continue to pay a customs toll of 15 cents per dozen and 15 per cent. ad valorem. This was decided by the board December 29 in a decision written by H. Hessenbruch, Philadelphia. The importer set up the claim that the articles should be received at the rate of 35 per cent. ad valorem.

Braiding Machines.

It has been decided by the Board of Appraisers that braiding machines imported by the Swiss Braid Company, New York, are not dutiable at the rate of 45 per cent. Instead, the board holds that the machines may be admitted at 35 per cent. as manufactures of wood. From the evidence submitted to the customs court it appeared that the machines are composed in chief value of wood. On this account the board finds in favor of the importer.

Drilled and Finished Copper Plates.

The Board of Appraisers in a decision handed down December 29 has decided that drilled and finished copper plates, cut to pattern and forming parts of powder making machinery, must pay duty on the basis of 45 per cent. It was maintained by the importers that the plates should be admitted free of duty, or else at 2½ cents per pound. No samples or evidence being offered

by the importing firm, it is held that the return of the collector must be regarded as correct.

Reappraisal Proceedings.

The Board of Appraisers December 27 rendered a decision which is of general interest to importers. The decision deals with principles which have to do with reappraisal proceedings before the customs tribunal. The specific case before the Board of Appraisers stands in the name of William H. Harris, Boston. The importer questions various reappraisal proceedings made by the General Board, but only three of the allegations are considered of any weight by the reviewing official, Judge Hay. In the first place, Mr. Harris claimed that when his importation was up for reappraisal he did not have a full and fair hearing before a board of three general appraisers. According to the importer, the chairman of the board promised that he would receive notice of further hearing, and be allowed an opportunity to rebut the evidence offered by the Government. The importer's second cause of complaint lay in the fact that the wool which was bought as mixed wool, although separated and invoiced in three grades, was appraised separately for each grade by the appraiser and the Board of General Appraisers, whereas, following the custom of the country whence it was exported, where all wool is sold mixed, they should have placed a value as mixed wool on the importation. Another point made by the protestant was that the Board of Appraisers did not have before it and examine one package in every 10 from each invoice, and that the collector did not, as required by section 2901 of the Revised Statutes, order one package of every invoice, and one package at least of every 10 packages of merchandise, brought to the Federal Public Stores for examination. After an exhaustive analysis of the objections filed by the importer, General Appraiser Hay overrules them all and affirms the validity of the original reappraisal. The action of the board is construed as a weakening of the Federal statutes in their application to customs administration. Various decisions of the United States courts appear to be in conflict with the conclusion reached by the lower customs tribunal, and it will not be surprising to tariff experts if the entire question is again thrown into litigation. According to the highest tribunals it is incumbent upon the appraising officers to examine at least 1 in every 10 packages on an invoice.

The monthly meeting of the American Society of Mechanical Engineers scheduled for Tuesday evening, January 8, will be the first to be held in the new building of the Engineering Societies, at 29 West Thirty-ninth street, New York City. The meeting will be in the main auditorium, and will be addressed by Frederick P. Fish, president of the American Telephone & Telegraph Company, on the subject, "The Ethics of Trade Secrets in Relation to the Patent System." The members of the society are privileged to bring as guests such engineers as are likely to be interested. The entire building will be open for inspection at this time, affording an excellent opportunity for those present to see for themselves what most know of only by previously published descriptions. The society's offices are already installed in the new building.

The officers and Executive Committee of the Republic Iron & Steel Company start this week on a tour of the Northern plants of the company. Similarly, the officers of the Tennessee Coal, Iron & Railroad Company and its Executive Committee will make a tour of the works of the company, starting about January 20, and a meeting will be held at Birmingham.

The second annual electrical show of the Electrical Trades Exposition Company will be held at the Coliseum, Chicago, January 14 to 26, and from present indications promises to be the largest exposition of its kind ever held in the West. More than 30,000 sq. ft. of floor space have been sold to 150 leading manufacturers and jobbers for exhibition purposes.

The Lake Iron Ore Trade in 1906.

BY DWIGHT E. WOODBRIDGE, DULUTH.

There has been one overwhelmingly important event of the year in Lake Superior iron mining circles, and but one. The business otherwise moved along without special incident apart from the results of unusually large traffic and the activities commensurate therewith. The one great event was, of course, the so-called "Hill ore deal," in which the Great Northern road sold its iron ore tonnage in the ground on the Mesaba range, discovered and to be found later, together with the ores owned by interests more or less directly connected with the Great Northern, to the United States Steel Corporation.

The Importance of the Hill Deal.

What every may be opinions as to the tonnage found on these lands, or that will ultimately be developed there, the importance of this transaction can scarcely be overestimated. While the United States Steel Corporation may have bought other groups of Mesaba range lands that added as much tonnage as does the Great Northern group, there has never been a purchase of similar moment, viewed from its influence on other lands and on other steel making concerns. What James J. Hill gathered together for the Hill deal, including those lands owned wholly and in part by his road or entirely by outside parties, was apparently the last large block of Mesaba range ore not already in consumers' hands. This is not to imply that additional exploration on the Mesaba will fail utterly, for that district is not yet entirely explored, and there are likely to be many deposits that have been overlooked in the search of the past 15 years. But in the very nature of things these must be small and scattering. Nor can a sufficient number of them be found, in all probability, to warrant new competition worthy the name with the steel makers now in possession of the field. Nor, the Mesaba aside, with all the exploration and widespread search that has been induced by the needs of steel makers and the high price of iron, are there new fields of sufficient magnitude to indicate that the future pressure for ore will be withdrawn from the Mesaba range.

What has characterized Mesaba work is true of explorations carried on in older districts. Though ore has been found, it is of small consequence when measured by an annual product of nearly forty million tons.

The Great Northern ore sale has set a new standard of value of ore in the ground. While it is fully recognized that the incentive for such a purchase was wanting for any but the largest companies, and that none but the largest was in position to undertake the obligations and burdens of such a transaction, the figures of this deal have affected all royalties. Some owners have been able to take advantage of this and have secured large royalty rates, others are hoping to do so, and there has been all along the line a considerable change in valuations, as measured by the sellers. From the time that the Oliver Iron Mining Company bought large tracts on the Western Mesaba of the Canisteo Mining Company, and when, still later, it took an undivided half interest in the Walker lands, the remaining half being held by the Great Northern, the ultimate purchase of all these Great Northern lands was not to be doubted for a moment. The Duluth, Missabe & Northern road was built to that part of the range, and extensive operations were planned, both on Canisteo lands and on those of the Great Northern.

Hill Mines Not to Be Ready for 1907.

It is not through any fault of the companies interested that the operation of mines upon these lands will be delayed, generally speaking, for another year. The delay is due to the determination of the Oliver Company to open these immense mines on the most improved and scientific principles possible, and to prepare itself for a vast product at the lowest cost per ton. Vast sums have been spent, and this expenditure is continuing, in the preparation for the beginning of mining operations on the Western Mesaba, enormous stripping operations are in progress, model towns are building, investments of hundreds of thousands of dollars are being made simply to assure

the company that its employees shall be of the character desired and shall be reasonably permanent. It will probably be 1908 before any tonnage commensurate with the magnitude of preliminary operations is taken off any of these western Mesaba lands, whether included in the Great Northern deal or not. And while so great progress is going on there, the rest of the region is moving similarly. Preparations for the opening of very large new mines are under way.

Important Developments in Stripping.

The possibilities of the stripping operation are constantly increasing and groups of properties are being consolidated for operation as a single open pit. The constant increase in timber costs and in labor is leading mine operators to strip deeper and deeper, and now plans are made for the removal of from 110 to 130 ft. of overburden from Mesaba mines. But while the greater part of Mesaba range ore comes out of open pit mines, the number of shaft properties is more, and will doubtless continue so, than of the open pits. There are many problems to be considered in the opening of a mine, even if the depth of surface is such as would permit its opening by stripping, and not all of these can be settled in one way. With the increased depths of stripping one change that is bound to come in the manner of opening many mines will be the elimination of the long approach for locomotives into the pit and the substitution therefor of a stationary engine that shall haul loaded cars up a steep incline. One of the important items of stripping costs is the approach, especially if it is not over ore, and in the development of every mine there must come a time when the approach shall not be on ore.

Stripping as a means of mining Lake Superior deposits, aside from those of the Mesaba, is gaining popularity, and on the Menominee range there are many milling pits, as well as some from which the surface has been taken off preparatory to steam shovel mining. This manner of mining lends itself with especial aptitude to the lean Bessemer deposits of the Cascade district, south of Marquette, where there is little surface, where the ore is dry and, though hard, is easily broken by powder, and where the configuration of the ground is such as to assist shovel work materially in many cases. This district is sure to become more of a factor in lake mining than it has been, though one of the chief advantages its ores have had is passing—that of adding silica to the dryer ores of the Mesaba. A few years ago this was so notably the case that mines there were named "Mesaba's Friend" and the chief use of this ore was a mixture carrying excess silica for fluxing the Mesabas. But Mesabas themselves are now more siliceous. With the diminution of iron percentage silicon has risen, and they do not now need assistance from high silica ores of other districts. Furnacemen have noticed this change, especially in the past year, and are finding their fuel and labor costs somewhat increased and their capacity slightly diminished as a result.

The Million-Ton Class in 1906.

All the million-ton producers of the year are on the Mesaba, with the single exception of the Cleveland Cliffs Lake group at Ishpeming. These chief producers are as follows:

Mine.—Gross tons.	1906.	1905.	1904.
Mountain Iron.....	2,541,785	2,495,080	1,168,855
Hull-Rust	2,257,420	505,179	1,415,884
Burt	1,376,874	1,860,452	
Fayal	1,634,541	1,358,922	975,102
Adams	1,238,340	1,140,984	940,105
Mahoning	1,275,202	1,011,661	706,325
Stevenson	1,050,000	1,428,614	1,652,021
Morris	1,809,743	1,070,937	Not opened.
Cleveland Cliffs.....	1,149,507	1,288,416	743,203

The only property in this list whose output is estimated is the Stevenson, whose owners, Corrigan, McKinney & Co., refused to make a report for 1906.

Such mines as the Biwabik, Norrie and Chapin, which

have in occasional preceding years reached the 1,000,000-ton point, during 1906 fell somewhat behind. With the exception of Mahoning, Cleveland-Cliffs and Stevenson, all the producers listed above are operated by the Oliver Iron Mining Company. The nine mines of this larger class produced an average of more than 1,500,000 tons for this single season, a most astonishing record. Probabilities for an increase in this number of 1,000,000-ton mines the coming season are excellent. They will include all in the above list, and to these may be added Biwabik, Stephens, Hartley and Chemung, all of which will then be in position where the tonnage to be produced can easily reach this quantity.

The Search for New Mines.

With the growth of production and the demand laid on mines, it is natural that exploration everywhere should be intense. More drill work under way on Lake Superior than for some years, and it is more scattered over the entire lake region than during any previous period of excitement. The Mesaba is pretty well explored, though a few properties are being found. As I write I learn of one 40-acre tract in the central Mesaba, explored at least half a dozen times, on which the latest explorer already has three or four holes from 50 to 80 ft. in good merchantable ore. This is not unusual, in fact, all ore that has been found for some time, or that may be found in the future on that range, must be on lands that have been explored at least once. Much of the drilling now in progress on the Mesaba range is to develop the limits of known ore bodies for opening on a modern and scientific plan. A good deal of work with diamond drills is in progress all along the Menominee. The Crystal Falls District is less favored than the Iron River, Stambaugh and others, but many drills are meeting with excellent indications of ore, and some mines have been found. Explorations are in progress on the western Gogebic range, where little has been done for years, and there is a good deal of development underground at old mines of that district, in the hope of meeting with a deep continuation of the ore lenses beneath dykes that had been looked upon as basal.

On the Canadian side of the lake not much has been done. Near Port Arthur and along Loon Lake test pitting has been under way and reports are given out estimating the ore in sight at 200,000,000 of tons. Mining men who have looked over this work recently are inclined to take these statements with considerable allowance. It seems scarcely possible that any such tonnage has been shown, and the known character of the district is such as to make estimates there somewhat misleading. The United States Steel Corporation has been working further north, near Nipigon Lake and river, and further west, along the Mattawin and Atikokan rivers, and with what success is not known. But the Atikokan Iron Company, whose furnace at Port Arthur is to blow in in 1907 and is to be supplied from Atikokan ores, is not yet in position to do much mining. Little has been done during the year in the Moose Mountain country, north of Georgian Bay, which will be opened in 1908. Baraboo is quiet and most of the exploring syndicates working there have ceased and abandoned the field. The Cuyuna District of Minnesota stands in about the same position as a year ago, except for the fact that a year more of work has brought it no nearer the realization of the hopes of its enthusiastic sponsors. Minable quantities of merchantable ores have not yet been found, except possibly in one or two cases, and even these few cannot now be marketed. The region is unfortunate in that its ores are too low grade to bear shipping and too high in phosphorus and other elements to be desirable anywhere. Then, too, freight rates when they are ultimately arranged for will doubtless discriminate against the district to the extent of 55 to 60 cents a ton over ores from the Cascade and Menominee regions that are better in most respects and more easily mined.

Exploration in the Cascade region has been carried on during the year by large interests, and one party has developed by drills more than 40,000,000 tons in one deposit, and has not yet reached the bottom of that ore. The quantities of ore that may be found there are stu-

pendous. But there is the usual fly in the ointment—this ore is not as desirable as it should be; it is low in iron and high in silica. These undesirable factors are somewhat offset by the possibility of cheap mining and the low percentages of phosphorus and moisture it quite frequently contains. Exploration of properties on the Vermillion range has been carried forward with considerable vigor and with about the usual Vermillion results. Even the famous section 30-63-11, which is now under lease to the Midland Steel Company, is not proving the mine hoped for, and comparatively little ore is yet found, though the shaft is down almost 500 ft. Little need be said about other Vermillion explorations.

Large Mesaba Expectations.

Of all the minor sections of the Lake region the Hibbing District of the Mesaba range has shown the most remarkable business for the year. In this section, which includes mines from the Stevenson on the west to the Morris on the east, the year's production was 13,000,000 gross tons, or more than half that of the entire Mesaba range. This Hibbing section is not enlarged to include many mines that with some degree of reason might be regarded as within its limits. These are large producers and the developments now going on about them indicate a great addition to their tonnage the coming season. Such a mine as the Hartley, which holds the record for rapid and difficult stripping, as well as for low costs per yard, is in this list. So is the Monroe-Tener, whose production is from three shafts and a large milling pit, equipped with electric trams and the most modern and economical devices for mining. So is the Shenango, which is to be stripped for a vast output; also the Leonard, from which the Oliver Iron Mining Company must take all the ore it mines from Great Northern lands in 1907, and the Pillsbury-Clark-Chisholm-Glen group, out of a part of which is to be made one of the big open pits of the district, and others.

A great deal of important work is under way or contemplated for the coming year, and a few of the items have just been mentioned. A tremendous operation is in progress around Virginia, where the Oliver-Lone Jack-Ohio-Norman group of Oliver Company mines is to be stripped on a comprehensive plan looking toward one magnificent open pit. The development of the Mahoning-Hull-Rust pit will make probably the largest ore area in the world, and stripping is going on very rapidly. At times during the past season there were from 14 to 16 steam shovels working on the 60 acres of opened ground of the Mahoning and Hull. Near Sparta the Oliver Iron Mining Company is opening its new Gilbert mine, a property whose developed tonnage places it among the very large mines of the world. It is to be stripped for milling; its two shafts, large pumping equipment, electric underground haulage, several steam shovels, and other machinery indicating the character of the operation intended, have been ordered.

The extensions and development of smaller Mesaba mines include so many properties that they would make almost a catalogue of the range. The same thing is true, to a less extent, of course, of other districts. On the Marquette there has been much new work, especially by the Cleveland-Cliffs Iron Company, and its Swanzy properties are giving an excellent account of themselves. At and near Negaunee the developments of the past year or two have been remarkable, and the mines centering about that city are fast taking the most prominent place on the Marquette range. Gogebic miners have been going deeper, equipping with a big steel lined shaft, steel shaft houses and heavier hoisting works, and believe that with additional depth they will work into wide and important ore lenses such as will materially increase the tonnage in sight from the Atlantic mine to Sunday Lake. On all old ranges exploration of old mines has added very greatly to reserves and the future never looked brighter for them than to-day.

The Shipping Record for 1906.

Iron ore shipments out of Lake Superior mines for the past few years have been as follows, including whatever has been shipped from the Michipicoten mine of the

Canadian side of the lake, and including all-rail business as closely as it can be estimated at the time of writing:

District.—Gross tons.	1906.	1905.	1904.
Mesaba range.....	23,759,156	20,153,699	12,156,008
Menominee range.....	5,285,806	4,495,451	3,074,848
Marquette range.....	3,687,494	4,210,522	2,843,703
Gogebic range.....	3,388,111	3,705,207	2,398,287
Vermillion range.....	1,799,247	1,677,186	1,282,513
Michipicoten range.....	121,555	169,527	117,153
Totals.....	38,041,369	34,522,965	21,939,992

Shipments for the year by the various railroad systems that handle ore from mines to the upper lakes, and to furnaces direct, have been as follows, with comparisons:

Railroad.	1906.	Per ct.	1905.	Per ct.
Duluth, Missabe & North.....	11,220,218	29.5	8,804,443	25.9
Duluth & Iron Range.....	8,205,128	21.6	7,778,768	22.9
Chicago & Northwestern.....	6,706,986	17.7	6,729,975	19.8
Great Northern.....	6,133,057	15.8	5,118,385	15.1
Lake Sup. & Ishpeming.....	1,889,631	5.0	1,844,823	5.4
Chicago, Mil. & St. Paul.....	1,934,140	5.1	1,310,021	3.9
Duluth, So. Shore & Atl.....	1,074,045	2.9	1,243,388	3.6
Wisconsin Central.....	693,852	1.9	790,394	2.3
Wis. & Mich. (car ferry).....	62,757	0.2	.....	..
All rail not included.....	.....	..	198,000	0.6
Algoma Central (Michipicoten).....	121,555	0.3	169,527	0.5

These figures emphasize again the importance of the Mesaba, which supplied 62.4 per cent. of the total for the year, and furnished all but 100,000 tons of the increase over 1905. Its proportion of the total of 1905 was 58.3 per cent., and for 1904 it furnished 55.4 per cent. of the total shipped from Lake Superior mines.

Labor Legislation in Congress.

WASHINGTON, D. C., January 1, 1907.—The reassembling of Congress will be the signal for the inauguration by the leaders of organized labor, including the officials of the American Federation of Labor, of a campaign in the interest of certain so-called "labor legislation." The first measure to which they will give their attention is the Anti-Injunction bill, which in the form as introduced by Representative Pearre of Maryland, is urgently advocated by the Federation of Labor. Unfortunately for the advocates of this bill, however, the leading organization of railroad employees, not directly affiliated with the Federation, favor quite a different measure—namely, the Gilbert bill. It is an open question whether the House Judiciary Committee, before which similar measures have been pending for several Congresses, would have reported either of the two bills referred to had the labor leaders been a unit in favoring one of them; but in view of the failure of the labor men to reach an agreement there is little prospect that any action will be taken by the committee unless it should decide to postpone the entire subject indefinitely.

The Eight-Hour bill, which Mr. Gompers and his associates are very anxious to pass before adjournment on March 4 will be vigorously urged upon the attention of the Committee on Rules. The members of this committee, which includes the Speaker of the House, are personally opposed to the bill, and in spite of the fact that it has been favorably reported by the Committee on Labor it is doubtful that it will be permitted to come up at the present session. In any event, it could not pass the Senate at a short session. The labor leaders are somewhat handicapped in the effort to induce the Committee on Rules to permit the bill to be taken up by the fact that at the recent Congressional election Mr. Gompers and his associates made an open but lamentably unsuccessful fight upon the majority of the members of the Committee because of their alleged failure to give consideration to "the legislative demands of labor."

One important measure in the programme of the labor leaders is likely to become a law—namely, the Hunt bill—making all convict made goods subject to the laws of the States into which they may be transported. This bill is indorsed by the Bureau of Labor, which, as recently stated in this correspondence, has made an exhaustive investigation of the scope and character of the competition of convict labor with "free" labor. The

bill has already passed the House, and thus far has developed no opposition except that of a few contractors for prison labor, with whose operations it would seriously interfere. The annual output of convict made goods is now estimated at about \$25,000,000, but on account of the very low prices at which they are sold they are able to displace not less than \$40,000,000 worth of "free" goods. The prison made products include stoves, stove hollow ware, numerous articles of hardware, agricultural implements, &c.

No little interest attaches to the efforts of the labor leaders to secure early action on the pending child labor bills introduced in the Senate by Senators Beveridge and Lodge. These bills prohibit interstate commerce in the products of minors under the age of 14 years or between 14 and 16 years, unless such minors have been granted certificates by the school authorities, as to the possession of certain educational qualifications. Such a measure would have a very important effect on nearly all industries, but many of the ablest lawyers of the Senate and House question the constitutionality of its provisions. A resolution has therefore been adopted by the Senate requesting the Judiciary Committee to make a report on the constitutional power of Congress to enact such a law.

Under a special order adopted by the House Committee on the Merchant Marine and Fisheries, the modified Ship Subsidy bill will be called up immediately after the holiday recess and forced to a vote. The leaders of organized labor are fighting the measure, though they have not thus far succeeded in making a clear statement of the reasons for their opposition, which seems to be based on a misapprehension as to the probable operation of the naval reserve features of the bill. The entire membership of the House Committee will be in Washington for the first time this session after the holidays and the promoters of the bill claim that it will be favorably reported by a vote of 10 to 8. In its present form the bill provides for little else than mail subventions for existing lines of steamships and for certain other lines to be established hereafter. The shipbuilders, however, are showing a lively interest in the measure, which in their opinion will stimulate shipbuilding for the foreign trade to a considerable degree. Even those who do not see any immediate advantage to the shipyards in the provisions of the measure express the opinion that its effect on commerce will be such as to induce Congress to supplement it with something more substantial in the early future.

W. L. C.

An Interesting Piston Packing.—For steam and gas engines, pumps, air compressors, &c., a novel form of piston packing is made in Glasgow. It consists of three rings, the two outer ones being the packing rings proper, while the inner one is a tension ring. This has about double the amount of spring power possessed by the other two, and its construction is such that it does not touch the cylinder walls, its pressure being transmitted to the other two rings instead. It fits them at such an angle that the resultant side pressure tends to lock the bearing rings in the groove, and thus produce a semisolid piston. In this way it avoids the defect common to steam-set packing rings, of wearing the cylinder bore large at the ends, where the steam pressure is greatest. For steam, the packing is made of a special cast iron, and for water pumps of a special bronze. The construction is simple, being straight lathe work, with no hand fitting required. This packing is particularly recommended for use with superheated steam at high piston speeds.

A new hoisting rope should be oiled within two or three days of its first being put to work. The oiling should be repeated at least once a month for the first six months, and then every six weeks. In a dry, down-cast shaft this may be considered needlessly frequent, but in an upcast or wet shaft the oiling may be required more often. The process of oiling affords an excellent opportunity for examining the condition of the rope. The oil can be removed by cotton waste soaked in gasoline from any part where a defect is suspected.

The Free Alcohol Law in Force.

WASHINGTON, D. C., January 1, 1907.—The new free alcohol law enacted by Congress last June goes into force to-day under regulations prescribed by the Commissioner of Internal Revenue, the chief features of which have heretofore been described in *The Iron Age*. While the highly optimistic expectations of certain prospective producers and consumers will probably not be realized at the outset, nevertheless a large consumption of denatured spirits is already guaranteed, with the certainty that it will increase rapidly with the decline in price, which is sure to follow the promised reduction in the cost of the product.

Denaturing Methods.

The Commissioner of Internal Revenue has recently taken important action with a view to reducing the cost of denaturing materials and the consequent price of the finished product. The original formula for denaturation consisted of 10 gal. of wood alcohol of certain chemical characteristics and $\frac{1}{2}$ gal. of benzine to 100 gal. of grain alcohol. The relatively large percentage of wood spirits prescribed by this formula made the cost thereof a consideration of much importance, as it was understood at the outset that untaxed grain spirits would be procurable at a much lower price than wood alcohol. Certain parties preparing to manufacture denatured alcohol recently complained to the commissioner that they were unable to contract for wood spirits for methylating purposes at less than 70 cents per gallon, although it had been represented to them that they would be able to buy unlimited quantities at 45 cents. That official rather hastily promulgated an alternative formula practically identical with that now in use in Germany. This formula prescribed 2 gal. of wood alcohol and $\frac{1}{2}$ gal. of pyridin bases to 100 gal. of grain alcohol. Pyridin bases are by-products of the production of coke in the economical by-product ovens. The supply in this country is comparatively small, and is rather closely held, although it is understood that a steady demand for the article would speedily be met by a number of concerns handling the by-products of the coke ovens who do not now attempt to find an outlet for the pyridin bases.

Following the promulgation by the commissioner of the alternative formula, the principal producers of wood alcohol of a quality suitable for denaturing issued a circular offering their product at 45 cents per gallon, and a strong movement is now on foot to induce the commissioner to revoke the alternative formula; first, because it deals a severe blow to the wood alcohol producers and refiners, and, second, because alcohol so denatured can easily be purified. While it was originally believed that the alternative formula supplied a cheaper denaturant, careful investigation shows that there will be substantially no difference in the cost. The danger to the revenue, therefore, appears to be an overshadowing consideration, and it is believed that the new formula will be rescinded, especially in view of the fact that an unlimited supply of wood alcohol is now guaranteed at a reasonable price.

Cost of Denatured Alcohol.

The internal revenue officials are in receipt of many inquiries as to the probable cost of denaturing alcohol, but while they are in position to state the approximate prices of the denaturing materials, they cannot give the cost of the finished product. From other reliable sources, however, the correspondent of *The Iron Age* is able to state that denatured alcohol, prepared under either the original or the alternative formula, will be available for manufacturing purposes at 36 cents per gallon. For heat, light and power, however, a 90 per cent. alcohol will be procurable at 28 to 30 cents per gallon. These calculations are based upon high proof grain alcohol selling at 35 cents per gallon, wood alcohol at 45 cents, benzine at 20 cents and pyridin bases at \$1.60.

The chief use to which denatured alcohol will be put at the outset will be the manufacture of lacquers, bronzes, enamels, varnishes, &c., in the production of which it will afford a material costing only a fraction of that for which it is substituted. These articles, which are largely

consumed in the hardware and metal trades, are manufactured with the use of either pure grain alcohol costing \$2.50 per gallon, fusel oil costing about \$1.50 per gallon, or wood alcohol costing 70 cents per gallon. It is obvious that all these materials will be promptly and completely displaced by denatured grain alcohol at 35 cents per gallon, except that small quantities of fusel oil will continue to be used for products to which it is especially suited.

Alcohol for Heat, Light and Power.

It is not to be expected that there will be a large consumption of denatured spirits for heat, light and power during the first few months under the new law. Experiments conducted under conditions of high scientific accuracy have demonstrated that 1 gal. of alcohol for lighting purposes is equal in efficiency to 2 gal. of kerosene. On this basis 28-cent denatured alcohol would be equal to 14-cent kerosene, which is not procurable in many parts of the country. Lamps, ranging in sizes from small portable affairs to large devices of 200 or 300 candle power, are now being manufactured and will be offered for sale in all parts of the country.

The introduction of denatured alcohol for power purposes promises to be gradual, but nevertheless considerable quantities of this fuel will be used at the very outset. The element of safety as compared with gasoline will be of even greater importance than cost for certain purposes, and inasmuch as the price of gasoline is 25 cents per gallon or more in the Middle and Far West, there is good reason to believe that 28-cent denatured alcohol will prove a dangerous rival of the petroleum product. It is predicted that denatured spirits will be available for heat, light and power at 23 cents before the year is out, with a prospect that in the near future it will be still cheaper.

W. L. C.

Allowable Belt Speeds.—There have been various estimates of the belt speeds above which it is unwise to go in the transmission of power. The item of centrifugal force at high speeds furnishes the limiting element. The centrifugal tension due to a strip of belt 1 in. wide, moving at V ft. per second is $0.012 tV^2$, where t is the thickness in inches, the weight of the leather being taken at 56 lb. per cubic foot. For single belts 3-16 in. thick a working tension, T , of 45 lb. per inch of width may be assumed, and similarly, for double, triple and four ply belts, 80, 110 and 145 lb. per inch of width. The effective tension in the belt will be $T - 0.012 tV^2$, which will be zero when $T = 0.012 tV^2$, or at a speed of 8485 ft. per minute for a single belt, and 8000, 7659 and 7616 ft., respectively, for double, triple and quadruple ply belts. A table calculated upon the formula shows that for single belts the power transmitted per inch of width gradually increases with increasing speeds up to a maximum at 4900 ft. per minute, after which it falls off. With double belts the limiting speed is at 4600, and with triple and quadruple belts at 4400 ft. per minute.

A Notable Roundhouse.—In connection with two new yards of the Pennsylvania Railroad Company, at East Altoona, Pa., there has been built a large roundhouse, with locomotive drop pits of novel design, and equipped with an overhead traveling crane. The building is a complete circle 395 ft. in diameter, and has 52 stalls 90 ft. deep, with a central turntable 100 ft. in diameter. The main portion is 65 ft. wide, with a 60-ft., $12\frac{1}{2}$ ton crane, and with a parallel lean-to span in which are placed the smoke outlets. Of the four drop pits, one is of such a size as to take all the driving wheels at once. Two of the others take single pairs of driving wheels, while the last has a capacity for truck wheels only. The table of each pit is operated by vertical screws, working in nuts revolved by worm wheel gearing. The screws descend into iron pipe sunk beneath the floor of the pit, thus economizing in the vertical space required in the pits themselves. The whole equipment is designed with an eye single to utility, and to rapidity and economy in operation, all of the parts being built with ample strength and rigidity.

The Sheet and Tin Plate Trades in 1906.

BY B. E. V. LUTY, PITTSBURGH, PA.

In each one of the past few years the sheet and tin plate industries have undergone interesting and important changes, and 1906 proves to be no exception. Probably the most important and far reaching development of the year has been the marked increase in the trend toward

Regularity in Specifications,

and this regularity is being established both as to time and as to character of specifications. The time was when every tinker who had designed a new coffee pot expected to secure tin plate of a size which would cut to his individual pattern with a minimum of waste. Regular sizes were merely those which by fortuitous circumstances were called for by large consumers. Odd sizes included almost every other conceivable size, varying by quarter-inches in both dimensions. Men connected with the tin mills before the consolidation in December, 1898, well remember that one of the vexed questions in the efforts to reach the old price agreements was that of extras for odd sizes.

Conditions have been much the same with respect to sheets, although sheets have at no time been furnished by mills except in sizes which showed a reasonable interval in the progression of width and length.

Throughout the steel industry there is a growing tendency to lay out the work of the rolling mill more clearly and adapt modes of distribution and consumption to the convenience of the mill. Individual consumers of sheets and tin plates have been showing a marked tendency to mold their plans to fit the sizes most readily secured, and within a year or so what may be regarded as practically a new policy has been introduced, that of using material, where necessary, of a somewhat larger size than required, and charging the waste as a manufacturing cost. It can be seen that such a waste, naturally not large, may easily be much less than the cost of waiting for the exact size, or paying a premium.

A regularity is also being established relative to time of taking out material from the mill. Through several years of prosperity consumers of sheets and tin plates have found that they cannot run to the mill at any time and be certain of securing deliveries. They are getting into the habit of filing specifications further in advance and of taking the material and carrying it in stock.

Steadier Operation of Tin Mills.

A striking illustration of the above tendency is to be observed in tin mill operations. It has been the practice for years for many of the tin mills to close for a large part of the third quarter of the year, while when they resumed operations in the fourth quarter a large part of their product entered the mill warehouses to be shipped out early in the new year, shipments reaching the high point in February and March, when they would be not far from double the current output. It was the regular thing for the tin mills of the country to reach January 1 with a stock of 1,500,000 boxes. At the present time their stocks are but a small fraction of that amount, and had car supply been adequate they would be still smaller. This is despite the fact that production has been very much heavier during the second half of the year than it usually is. This is brought out by the following figures, representing the average number of tin mills in operation in each quarter during the past three years. Absolute accuracy is not possible, but it is believed the figures are correct within 10 mills in each case. Mills operated tin mill style, but in connection with regular sheet plants, are not included, and the large Western interest has been credited only with the fraction of its mills whose product is tinned.

Average Number of Tin Mills in Operation.

	1904.	1905.	1906.
First quarter.....	265	295	270
Second quarter.....	270	300	260
Third quarter.....	175	150	265
Fourth quarter.....	215	170	285

In studying this table comparisons should be made between one quarter and the adjoining quarter, rather than between similar quarters in different years, since the output limit in union plants was abolished the middle of 1905, and thereafter outputs were larger per mill in such plants. There has been, besides, a progressive increase in output per mill. It will be observed that in 1904 and 1905 a few more mills operated in the second than in the first quarter, while in 1906 the reverse was the case. This was due solely to the scarcity of steel. After July 1 the year 1906 entirely cut loose from precedents, operating as many mills in the third as in the second quarter, and more in the fourth than in any previous quarter. The canning crops in the second half of 1906 were a disappointment. The demand should have been under rather than over the normal. The facts remain that second half production has been much larger, and mill stocks at the close are much smaller than called for by precedent. The obvious explanation is that already given, that jobbers and consumers are carrying larger stocks for their own protection. To assume otherwise would be to predict a most distressing famine in tin plate the coming spring.

Production.

Unfortunately complete statistics of production in the sheet and tin plate industries are not presented. The total tonnage of the American Sheet & Tin Plate Company is given in the annual reports of the United States Steel Corporation. We estimate that the tonnage to be thus returned, in the forthcoming annual report, will be about 1,100,000 gross tons, the quantity comparing with previous returns as follows:

Production of the American Sheet & Tin Plate Company.

	Gross tons.
1902.....	699,621
1903.....	763,670
1904.....	735,482
1905.....	924,439
1906.....	*1,100,000

* Estimated.

This would show an increase of 19 per cent. in 1906, a circumstance worthy of note in view of the fact that pig iron production has increased but 10 per cent, and output of finished materials generally must have been in some such ratio. The increase in tin plate production has probably been about 10 per cent., while the increase in sheet production has been much more, and the output of gauges under 20, not box annealed, and of light plates may have been the greatest of all.

While the American Iron and Steel Association returns no separate statistics of sheet production, combining the tonnage with plates, it does return approximate statistics of black plate and of tin and terne plate production. It reported 507,587 gross tons of black plates produced in 1905 and 493,500 tons of tin plates. We estimate the former at 560,000 tons in 1906 and the latter at 540,000 tons.

The Number of Mills.

There has been no change in the number of sheet mills of the leading interest during the year, its equipment comprising 158 regular sheet mills, six jobbing mills and two light plate mills, a total of 166 mills, besides which there is the Mercer plant at Sharon, Pa., the equipment there consisting of a Bray continuous mill and five finishing mills. As to actual equipment it is a five-mill plant and was so operated when the Bray mill was undergoing repairs, but as to capacity this plant is fully equal to an ordinary 10-mill plant. Extensive additions, however, are about to be made.

At the close of the year the leading interest was just completing the addition of three tin mills to its existing plants, one being added at the Pittsburgh works and two at the Pennsylvania works. These are both at New Kensington, Pa., and with the additions are eight-mill plants. The total number of tin mills is thus increased to 255, against 248 at the close of 1905. The four additional mills at the Sabraton Works, Morgantown, W. Va., were completed and put in operation early in the year. In arriving at the total of 255 tin mills, the Monongahela plant is credited with its eight finishing mills, no allowance being made for the Bray continuous mill in operation at that plant, and increasing the actual

output. In the last few months of the year the 252 completed mills were being operated regularly, with the exception of mills occasionally off through accident or scarcity of coal or steel, the six-mill Humbert, the eight-mill Gas City plant and the seven-mill Anderson plant. These plants would be transferred to the abandoned list were it not that it is a very small expense to keep them as reserves in case of extreme pressure. They have not been operated since the first half of 1905.

The Interstate Steel Company, allied with the Allegheny Steel Company, has just added two mills to its sheet plant, giving it six mills, while the Allegheny Steel Company has seven. Further enlargements are contemplated. The Standard Tin Plate Company added a mill, giving it a six-mill plant.

In the table below is given the number of mills at the end of each of the past five years. It will be observed that the number of tin mills of the leading interest decreased to 1904. This was due to the dismantling of plant; its actual operative efficiency has been materially increased. The number of independent sheet mills showed a large increase from 1902 to 1904, and then appears to have increased still more. The totals here given are from lists compiled in the years named, and there have been necessary differences in the treatment. A large number of sheet mills were built in 1903 and 1904, and as business was more or less depressed at the close of those years, there was no means of determining what mills should be excluded as practically inoperative. The year 1906, on the other hand, was a good test, and not a single mill is included in the list, which shows a total of 130 independent sheet mills at the close of the year that had not been in actual regular operation during the year. A further cause for the diminution is that a few years ago a number of mills were prepared to make heavy gauges. These have either been abandoned or have been converted into regular light plate mills and thus disappear from our total.

Actually Operative Mills at the Close of the Year.

	Sheet.		Tin plate.	
	Corpo- ration.	Inde- pendent.	Corpo- ration.	Inde- pendent.
1906.....	171	130	255	110
1905.....	171	130	248	109
1904.....	163	170	242	83
1903.....	164	155	264	71
1902.....	164	136	264	71

Included in the tin plate mill total for 1906 are a number of mills which are operated tin mill style, but the product is not coated.

New Construction.

The American Sheet & Tin Plate Company has started upon some important extensions and improvements in its sheet department. At the Guernsey Works, Cambridge, Ohio, four new sheet mills are being added, and at New Philadelphia, Ohio, one sheet and one jobbing mill, while the whole plant is being reconstructed; the Scottdale Works are being reconstructed, a new galvanizing plant is being added and the number of mills will probably be doubled. No important tin plate work is on, outside of the addition of three mills at the New Kensington plants, now practically accomplished.

The independent sheet capacity is also being increased, the La Belle Iron Works, at Steubenville, Ohio, having a sheet plant under construction and the Seneca Iron & Steel Company, Buffalo, N. Y., having lately placed contracts for a sheet plant.

Prices and Competition.

Whatever may have been the cause, it is a fact that the acrimonious competition of 1905, referred to at some length in the review a year ago, was not present in 1906. Mention was made of the fact that the personal element was introduced into the case of the leading interest versus the independents. That personal element has totally disappeared. The regular market prices for both sheets and tin plates have been steadily maintained during the year. There have been practically no charges of cutting, and at all times the actual and nominal markets have been identical. It must be admitted that there has been a distinct change in the competitive situation from 1905 to 1906, and as there will be differences of opinion as to how the

change was brought about the subject will not be discussed.

The Raw Materials.

There has been almost universal suffering from the high price and scarcity of raw materials. Pig tin averaged 36½ cents a pound in the first quarter; thereafter it did not get as low as 36 cents on a single day, and reached 49½ cents, the high point of all statistics, on May 14 and 15. For every month following July the average price has been above 40 cents. This is in striking contrast with the market in the old days when "eight pounds for a dollar" was regarded as the low limit, and about 15 cents a normal price. The high price has been a hardship to consumers. There is no use criticising those who are responsible for it; when a metal is produced in one country, has its market price fixed in another and is consumed in a third there is no alternative for the third country but to find independent supplies. On April 1, 1906, the long time contract made by the American Tin Plate Company with Phelps, Dodge & Co. expired, and since then the American Sheet & Tin Plate Company has been buying its pig tin through the United States Steel Products Export Company. The London operators, who control the situation as best they can—and that is pretty well—have professed to find much amusement in the past few months in the operations of this, the largest tin buyer of the world. If the attempts to bear the market which they have observed have been all the attempts that have been put forth their criticism and amusement may be justified; but it does not follow that because certain things are seen very clearly there are no invisible things. Whether or not this tin buyer has been more astute than generally credited in London, it is certain that it does not need always to be dictated to, when it is by far the largest tin buyer in the world.

The independent sheet and tin plate mills have suffered greatly from the scarcity and high price of sheet bars. The Carnegie Steel Company, the chief source of supply for independents not possessed of their own steel mills, fell far behind in its outside obligations, although making every effort to meet them. After the middle of the year a considerable tonnage of sheet bars went over to the Republic Iron & Steel Company and the Youngstown Sheet & Tube Company, to the satisfaction of all parties concerned. Toward the close of the year the Folsbee Bros. Company completed its steel plant, and thus became independent of the market.

Price Changes.

The market has been so steady that nothing more need be given under this head than a schedule of the price changes, with the dates as announced:

January 8.—Black and galvanized sheets advanced \$2 a ton to 2.40 cents for black and 3.45 cents for galvanized; tin plates advanced 10 cents to \$3.50.

April 7.—Tin plates advanced 10 cents to \$3.60.

May 18.—Tin plates advanced 15 cents to \$3.75.

June 5.—Black and galvanized sheets advanced \$2 a ton to 2.50 cents for black and 3.55 cents for galvanized.

October 25.—Black and galvanized sheets advanced \$2 a ton to 2.60 cents for black and 3.65 cents for galvanized; tin plates advanced 15 cents to \$3.90.

The Amount of Coating.

An important movement was started by the canning interests looking to the use for containers of moist food products of tin plate with a heavier coating. The object is not so much to increase the average coating as to make it certain that on no part of the plate does the amount of coating fall below a certain minimum. The minimum proposed works out to about 2 lb. per box, the present trade practice, but how much more than that would have to be used per box to insure the maintenance of the minimum is a matter that must be worked out in the tin house.

The American Sheet & Tin Plate Company toward the close of the year announced that it would in future stamp all prime roofing plates with the number of pounds of coating per box. Apparently this is a simple reform, but it is certain to have far reaching consequences. Of course, the actual quantity of coating is not the only factor entering into the value of roofing plate as a resistant to the weather, but it is obviously the most important.

PERSONAL.

A. O. Backert, who has for a year and a half most acceptably filled the position of Western editor of *The Iron Age*, has resigned to become editor of *The Foundry*, Cleveland, Ohio.

T. J. Wright, who has been identified for many years with Western iron and steel interests and with industrial affairs generally, has been appointed Western editor of *The Iron Age*, with headquarters at Chicago.

William B. Schiller, president of the National Tube Company, Pittsburgh, who has been confined to his home since September 25, on account of an accident, has almost recovered and expects to be in his office early this month.

M. A. King has been made director of the Pressed Steel Pole Company, Scottdale, Pa., and G. E. Mullin has been made treasurer.

Henry C. Frick has been elected a director of the Pennsylvania Railroad Company.

E. C. Sattley, manager of the Page Woven Wire Fence Company, has been chosen second vice-president of the Pittsburgh Traffic Club. L. H. Constans, traffic manager of the Pittsburgh Steel Company, and L. C. Bihler, traffic manager of the Carnegie Steel Company, have been elected to the Industrial Board of Governors.

Thomas F. Cole will probably retire from the management of the Lake Superior iron ore interests of the United States Steel Corporation at an early date, in order to give his entire attention to the enormous copper mining undertakings of which he is the creator and the virtual head.

John Birkinbine, who has given 10 years of devoted and efficient services to the Franklin Institute of Philadelphia as its president, has declined a renomination for the ensuing year. Considering its meager resources, this ancient institution is doing an enormous amount of good, and it is hardly a credit to the public spirit of Philadelphia that it does not receive more generous support. It is understood that Walton Clark of the United Gas Improvement Company has been nominated for the presidency, and that Mr. Birkinbine has signified his willingness to act as one of the managers.

Asa M. Mattice announces that he has accepted the management of the works of the Walworth Mfg. Company, at South Boston, Mass.

Dr. E. Schroedter, the accomplished manager of the Verein Deutscher Eisenhüttenleute, recently completed his twenty-fifth year in that office. Formal congratulations were extended by the president of the association at its annual meeting on December 9, and the Karl Lueg medal was presented to Dr. Schroedter on behalf of the association.

George Burnham, Jr., retired January 1 from the firm of Burnham, Williams & Co., proprietors of the Baldwin Locomotive Works, Philadelphia. He had been a member of the locomotive firm for 10 years, the other partners being George Burnham, father of the retiring member; William P. Henszey, John H. Converse, William L. Austin and Samuel M. Vaclain. Mr. Burnham will be succeeded by Alba B. Johnson. Notwithstanding that suggestions of incorporation have often been made, the business of the Baldwin Locomotive Works has been conducted as a private partnership since its establishment, in

J. W. Duntley, president of the Chicago Pneumatic Tool Company, has just returned from his twenty-first trip to England and the Continent in the interest of the pneumatic tool business. He spent six weeks abroad, visiting the trade in general in England, Scotland, France, Germany, Belgium and Italy. He reports the pneumatic tool business growing at all points abroad, and is much gratified over the fact that the current year has shown an increase of between 25 and 30 per cent. over any previous year.

W. H. S. Bateman, who for the past 14 years has been connected with the Lukens Iron & Steel Company, Coatesville, Pa., during 12 years of which he held the position

of general traveling representative, severed that connection January 1 to enter the employ of the Chicago Pneumatic Tool Company. He will be attached to the general Eastern sales department, with headquarters in the Arcade Building, Philadelphia, and will look after Southern business.

OBITUARY.

SAMUEL LITTLE, Boston, for many years president of the West End Street Railway Company, until it was absorbed as a part of the Boston Elevated system, and formerly president of the Boston Lead Mfg. Company and the E. Howard Watch & Clock Company, Boston, died December 21, aged 79 years. He was a native of Hingham, Mass., and most of his early business career was passed in banking. He leaves one son, Arthur Malbon Little, who is treasurer of the E. Howard Watch & Clock Company.

EDWIN G. CRAWFORD, vice-president of the Carondelet Foundry Company, St. Louis, died December 19, of pneumonia, aged 51 years. He was born in Madison, Ind., and had been engaged in the foundry business for 30 years, having been several years with the National Malleable Iron Company, Indianapolis, and the Indianapolis Foundry Company. For the past 17 years he had been connected with the Carondelet Foundry Company. He was considered one of the best foundrymen in the West, and his death will be much felt by foundrymen in general, among whom he had a large circle of friends.

WATSON G. MOODY, formerly resident manager of the Boston office of Rogers, Brown & Co. for a period of about 15 years, died December 21 at Idlewild, Rye, Colo., to which place he went some months ago on account of ill health. He had won and held the confidence and esteem of a large circle of business and social friends, particularly in the New England States. He is survived by a widow and two children, who will remain at Rye, Colo.

GEORGE W. LAUER, at one time an iron manufacturer in Jersey City and afterward one of the proprietors of the Robbins rolling mill in Philadelphia, died in the latter city December 29, aged 77 years. He retired in 1891. He leaves a widow and one son.

WILLIAM G. NEILSON, who had been identified with the iron trade from his youth, died suddenly from heart disease in his office in the Harrison Building, Philadelphia, December 29, aged 64 years. At the time of his death he was treasurer of the Keystone Drop Forge Works, whose plant is at Chester, Pa., and president and treasurer of the Republic Mining & Mfg. Company, a Georgia corporation. When a young man he was for a time connected with the American Iron and Steel Association, and the statistical work then done by him still has its recognized place in the records of that organization. He leaves a widow, four daughters and two sons.

DAVID THOMPSON, New York, iron importing merchant, died December 30, aged 84 years. He was the eldest graduate of Columbia University at the time of his death, having been a classmate of the late Abram S. Hewitt in the class of 1841. He was a native of New York City. He leaves a widow and two daughters.

ALEXANDER JOHNSTON CASSATT, president of the Pennsylvania Railroad Company, died suddenly December 28 of heart failure, at his residence in Philadelphia. He was born in Pittsburgh December 8, 1839. His father, Robert S. Cassatt, was the first Mayor of the city of Pittsburgh. The young man graduated from the Rensselaer Polytechnic Institute as a civil engineer in 1859 and immediately engaged in railroad work. Connecting himself with the Pennsylvania Railroad Company as a rodman in 1861, his advance was rapid. The great expansion of the Pennsylvania Railroad Company, which in recent years has been the marvel of the railroad world, was almost wholly due to Mr. Cassatt. In a technical sense he was considered the ablest railroad man in the United States. His judgment and advice were held to be of the greatest value, not simply in the railroad field, but in all problems, whether financial, commercial or economic.

NEWS OF THE WORKS.

Iron and Steel.

The Norwalk Steel & Iron Company, Norwalk, Ohio, which has been operating under a Delaware charter, has been re-incorporated under the laws of the State of Ohio. The capital stock remains unchanged at \$1,000,000, of which \$750,000 is common, and \$250,000, 6 per cent, cumulative preferred. The company manufactures laminated steel bars, forgings, plates, soft center plow steel, jail, vault and tool steel.

The Jones & Laughlin Steel Company, Pittsburgh, has bought from the Schenley estate a plot of ground on Second avenue in that city on which it has operated its coke ovens for many years. The price paid for the property is said to be \$117,000.

Preparatory to starting up again, the Irondale Furnace at Irondale, Wash., the new operating company, headed by J. A. Moore, Seattle, Wash., is enlarging the stack which was 50 ft. x 10 to 56 ft. x 11, with 6 ft. hearth diameter. The furnace has two Welmer blowing engines and the new owners are installing two new hot blast pipe stoves, one of 60 pipes and one of 30 pipes. A new battery of boilers will be erected of 350 hp. The capacity of the new by-product charcoal plant now under construction will be 7000 bushels of charcoal in 24 hr. A new conveyor system will be provided for handling ore and limestone. It is the expectation to build a plant for the manufacture of cement from furnace slag. The product of the furnace will be largely foundry pig iron but it will also be possible to produce low phosphorus Bessemer as well as basic pig. The capacity will be about 70 tons a day. Irondale is on Port Townsend Bay at the mouth of Puget Sound and within 40 miles of Seattle. William Price is superintendent of the furnace plant.

The new puddle mill built by the Longmead Iron Company, at Conshohocken, Pa., has been successfully started. It is completely equipped with electricity and contains ten furnaces.

The Seneca Iron & Steel Company, incorporated at Buffalo, N. Y., some time ago with a nominal capital of \$300,000, which will be increased later, will locate its plant adjacent to the plant of the Lackawanna Steel Company, and contract has been awarded to the Ritter-Conley Mfg. Company, Pittsburgh, for the construction of the buildings. The company has also contracted with the Lewis Foundry & Machine Company, Pittsburgh, for nine sheet mills, five of which will be hot mills, three cold mills and a roughing mill. Sheet, hoop and bar iron will be the principal products. The Lackawanna Steel Company will furnish sheet bar and billets for the new plant. James Patterson of Youngstown, Ohio, is president and Alexander Patterson of Pittsburgh, formerly connected with Zug & Co. of that city, is secretary and treasurer.

General Machinery.

The Model Machine Works, Frankfort, Ind., has been organized with a capital of \$10,000 to operate a machine shop. Joseph P. Palmer, C. H. Hillis, A. A. Laird and P. F. Gable are the incorporators.

The Moore Drop Forging Company, Springfield, Mass., whose plant was badly damaged by fire a few weeks ago, is repairing the machine shop and has placed a contract for a steel building, 50 x 128 ft., to contain the drop forging plant. The company is planning to start its plant in operation within the next 10 days or two weeks.

The Connecticut Computing Machine Company, New Haven, Conn., which manufactures a new computing machine, is having made tentative plans for a new factory, which will be necessary before next November, when present quarters in the building known as the Housatonic Mfg. Company building will have to be vacated, as the property has been acquired by the Fuller Mfg. Company, Brooklyn. The Connecticut Computing Machine Company has decided on no site for the new building, nor upon a type of building. The officers state, however, that land will be purchased somewhere and a factory erected by next November. The company is officered by men very prominent in Connecticut industries. The president is Hon. Rollin S. Woodruff, Governor of the State, and head of the business of the C. S. Mersick Company, New Haven; vice-president, Charles M. Jarvis, New Britain, of the American Hardware Corporation, and treasurer, Edward S. Swift.

Contracts for 8 drop hammers ranging from 800 to 3800 lb. in capacity have been awarded by the Atlas Drop Forge Company, Lansing, Mich. This plant when completed will be one of the largest drop forging plants in the West.

Power Plant Equipment.

The O'Keefe-Orblison Engineering & Construction Company, Appleton, Wis., has prepared plans and specifications for the erection of a water power plant for operating the municipal lighting plant at Marquette, Mich.

Scotfield Bros., Philadelphia, have been awarded the contract to supervise the construction of the 25,000-hp. plant the Reading Power Company will build at Reading.

Plans are maturing for the high pressure salt water fire system for San Francisco, Cal. The scheme includes, in addition

to fire boats and a series of reservoirs, at least two pumping stations capable of maintaining a pressure of 30 lb. to the sq. in.

Owing to the rapid growth of the business of the Washburn Company, Minneapolis, Minn., manufacturer of railroad and general steel castings, the present plant and equipment have been found entirely inadequate and additions are to be made that will materially increase the output. A new foundry building about 400 ft. long, 60 ft. wide and with 40 ft. lean-tos on each side will be built and one 20-ton basic open hearth furnace, and one 15-ton acid furnace will be installed. The addition of a crucible furnace or a baby Bessemer converter is also being considered. The plant will be electrically operated and will have a complete air equipment throughout. Work will be commenced about April 1, and contracts for the buildings and equipment will be awarded late in February or early in March.

The building known as the Putnam Tool Shop, Fitchburg, Mass., occupied in part by the Bath Grinder Company, has been purchased by the Rotating Engine Company, Boston, which proposes to occupy it for the manufacture of a new engine. As the Bath Company occupies only the first floor it is expected that there will be room enough for its purposes as well as for those of the new owners.

C. C. Putnam & Son, Putnamville, Vt., will be in the market in the spring for a boiler and steam turbine of 150 hp., and wishes information regarding turbines of this amount of power.

The business of the D. M. Dillon Steam Boiler Works, Fitchburg, Mass., has been incorporated under that name, with a capital stock of \$100,000. David M. Dillon is president; F. N. Dillon, treasurer; D. Frank Dillon, clerk; the officers constituting the Board of Directors.

The Compression Pump Company, Pueblo, Colo., has been organized with a capital of \$50,000 to engage in the manufacture of pumping machinery. The location of the new plant has not yet been decided, although several sites are being considered. W. L. Stone is president; Joseph Falardeau, vice-president, and E. H. Stone, secretary and treasurer.

The Columbus Power Company, Columbus, Ga., is developing a 200,000 hp. hydraulic plant on the Chattahoochee River, to supply current to the various plants in that vicinity which have considerably increased in number during the past few years and also for lighting purposes.

Foundries.

The Kaysing Iron & Foundry Company, St. Louis, Mo., has incorporated with \$10,000 capital and succeeds to the business of the Kaysing-Hirsch Iron & Foundry Company, established about a year ago. Upon the withdrawal of Harry O. Hirsch, his interests were purchased by others and the new company has been organized by the election of officers as follows: William G. Kaysing, president; E. De Vries, vice-president, and C. E. Collet, secretary and treasurer.

The new Capital City Foundry Company, Trenton, N. J., has purchased the Capital City Foundry which was owned by George H. Knapp, Alfred Knapp and A. E. Diamond. The company takes all the machinery, contracts, &c., of the old company and is now located in a new building which was built by the Trenton Abattoir Company for a foundry. The product will be gray iron and brass castings. Peter Schlicher is president; William R. Sweeney, vice-president; George H. Knapp, secretary, and Alfred Knapp, treasurer.

The Riverside Foundry Company, Wrightsville, Pa., has completed its new buildings and is now installing machinery for the manufacture of iron castings and builders' hardware. Work has been started on a 357-ft. siding from the plant to the Pennsylvania Railroad tracks, and in a few weeks the company will be in a position to take on custom work from parties desiring high-grade iron castings.

A company has been organized in Canton, Ohio, under the name of the Skull Steel Castings Company, to engage in the manufacture of all kinds of steel castings. A new plant will be built in the spring and it is expected to employ about 100 men at the start. The company is capitalized at \$150,000. The incorporators are: A. H. Elliott, J. H. Kaufman, Leonard E. Skull, E. G. Van Horn, Frank Bordner, John Hahn, Louis Van Horn, and M. A. Fisher, of Canton, and Frank Holden, of Dayton.

Hardware.

The Owensboro Shovel & Tool Company, Owensboro, Ky., manufacturer of all kinds of shovels, spades, scoops, &c., is erecting an addition to its plant, 76 x 90 ft., which will be devoted to the manufacture of handled hoes. The main factory, of brick, is 76 x 200 ft. in dimensions. The company is also putting up a building 50 x 100 ft. for the manufacture of wood D and long handles for its own use. In the way of power the company is installing two 100 hp. boilers and a 300 hp. engine. Practically all of the machinery required for these new additions has been ordered. The company hopes to be turning out handles and handled hoes in the early spring.

The Bonney Vise & Tool Works, Philadelphia, Pa., report a large trade in their Masterpiece combination wrench. Recently a single order was received for these wrenches amounting to \$4000, the goods going to South America. An unexpectedly large foreign demand for this wrench is noted.

The Iron and Metal Trades

The conviction is general throughout the Iron industry that the present tremendous rate of consumption will continue during the first half of the current year, coupled with prevailing generally profitable prices.

There are very many who are acting on the belief that work for full capacity at present or even better prices is assured for the whole of the year 1907. They point to the order books, which on the surface look very encouraging indeed, but which might be turned to a ragged exhibit, after a rush of cancellations such as the trade has witnessed before under similar conditions. There is a disposition to exaggerate the stability of "orders" which it is well to guard against.

The Iron Industry is passing again through one of its frequent experiences of being caught unawares by a rapidly expanding consumption, followed by a feverish activity to provide adequate producing facilities, which at first fall into line disappointingly slowly and then make themselves felt surprisingly suddenly. That may make its appearance during the second half of 1907.

In its last analysis the course of events in the second half of 1907 will depend first upon the crops, and second upon the ability of our country to finance the betterments and enlargements of its producing and transportation facilities. Time only can tell as to the first, while as to the second we may have ample warning through long continued tightness of the money market.

The holiday week has not sensibly affected the activity which has characterized the markets for some months past. In the Eastern Pig Iron markets there have been further sales of Basic Pig Iron, and some round lots of Foundry and Forge Iron have been placed. The Buffalo furnaces during the last two weeks of the year booked about 50,000 tons of Malleable and Foundry Iron, and there has been some lively buying for the last half in the Chicago District, with more pending. As yet nothing has been done in the way of purchases of large lots of foreign Foundry Iron for agricultural interests in the West.

The report is current that two Western roads have placed orders aggregating 90,000 tons for 1908 delivery, which may be interpreted as meaning that so much rolling capacity has been engaged.

Among the sales of Structural Material is a lot of 4500 tons for five buildings in San Francisco. It is believed that during the current year a very considerable tonnage will be required for the stricken city. This is in line with the earlier expectations that the true demand would not develop until a considerable time after the disaster.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,
Declines in Italics.

At date, one week, one month and one year previous.

Jan. 2, Dec. 26, Dec. 5, Jan. 3,
1907. 1906. 1906. 1906.

PIG IRON, Per Gross Ton:				
Foundry No. 2, Standard, Philadelphia	\$25.75	\$25.00	\$24.50	\$18.50
Foundry No. 2, Southern, Cincinnati	26.00	26.00	25.00	16.75
Foundry No. 2, Local, Chicago	25.50	25.50	25.50	19.25
Bessemer, Pittsburgh	23.35	23.35	23.35	18.35
Gray Forge, Pittsburgh	22.85	22.85	22.85	17.25
Lake Superior Charcoal, Chicago	26.00	26.00	26.00	20.00

BILLETS, &c., Per Gross Ton:				
Bessemer Billets, Pittsburgh	29.50	29.50	29.50	26.00
Forging Billets, Pittsburgh	36.50	36.50	36.50	30.00
Open Hearth Billets, Philadelphia	34.00	34.00	33.00	30.00
Wire Rods, Pittsburgh	37.00	37.00	37.00	33.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00

OLD MATERIAL, Per Gross Ton:				
O. Steel Rails, Chicago	18.00	18.50	20.50	16.50
O. Steel Rails, Philadelphia	20.00	20.00	20.00	18.25
O. Iron Rails, Chicago	28.00	28.00	28.00	23.00
O. Iron Rails, Philadelphia	27.75	27.75	27.50	24.00
O. Car Wheels, Chicago	25.00	25.25	24.50	19.00
O. Car Wheels, Philadelphia	23.00	23.00	23.00	18.75
Heavy Steel Scrap, Pittsburgh	20.00	20.00	20.00	17.50
Heavy Steel Scrap, Chicago	17.00	17.00	17.50	15.00

FINISHED IRON AND STEEL, Per Pound:				
Refined Iron Bars, Philadelphia	1.88½	1.83½	1.83½	1.93½
Common Iron Bars, Chicago	1.81½	1.81½	1.71½	1.85
Common Iron Bars, Pittsburgh	1.80	1.80	1.80	1.90
Steel Bars, Tidewater, New York	1.74½	1.74½	1.74½	1.64½
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.50
Tank Plates, Tidewater, New York	1.84½	1.84½	1.84½	1.74½
Tank Plates, Pittsburgh	1.70	1.70	1.70	1.60
Beams, Tidewater, New York	1.84½	1.84½	1.84½	1.84½
Beams, Pittsburgh	1.70	1.70	1.70	1.70
Angles, Tidewater, New York	1.84½	1.84½	1.84½	1.84½
Angles, Pittsburgh	1.70	1.70	1.70	1.70
Skelp, Grooved Steel, Pittsburgh	1.65	1.65	1.65	1.55
Skelp, Sheared Steel, Pittsburgh	1.70	1.70	1.70	1.65

SHEETS, NAILS AND WIRE, Per Pound:				
Sheets, No. 27, Pittsburgh	2.50	2.50	2.50	2.20
Wire Nails, Pittsburgh	2.00	2.00	2.00	1.85
Cut Nails, Pittsburgh	2.05	2.05	2.05	1.75
Barb Wire, Galv., Pittsburgh	2.45	2.45	2.45	2.35

METALS, Per Pound:				
Lake Copper, New York	23.75	23.50	22.75	19.25
Spelter, St. Louis	6.55	6.55	6.35	6.50
Lead, New York	6.30	6.30	6.05	5.95
Lead, St. Louis	6.05	6.05	5.87½	5.90
Tin, New York	41.85	42.80	42.45	36.05
Antimony, Hallett, New York	25.00	25.00	25.00	13.75
Nickel, New York	45.00	45.00	45.00	40.00
Tin Plate, Domestic, Bessemer, 100 lb., New York	\$4.00	\$4.00	\$4.00	\$3.50

Chicago.

FISHER BUILDING, December 31, 1906.

The revival of the demand for Pig Iron to cover future wants is the feature of the week's developments. Heavy sales of Malleable Bessemer for shipment in the last half have already been made, and the largest inquiry now being considered involves 15,000 tons of this grade. The car shortage, which is growing more acute and is delaying furnace shipments, has resulted in a widespread demand for spot iron and Southern operators have again advanced prices. The new year opens auspiciously for the Western finishing mills, the volume of whose unfilled orders has never before been approached. With the exception of Light Rails, Structural Material and Bolts, the year's output of the mills of the Illinois Steel Company has already been sold and all new tonnage will have to be delivered to the Carnegie Steel Company. Independent manufacturers are similarly situated, and there is every indication that the pressure on the mills for material will be increased during the next 12 months. Coke shipments from the Pocahontas and Connellsville fields have fallen off to an alarming extent, and furnace operators in this district, notwithstanding their by-product fuel supply, anticipate the banking of their stacks unless the deliveries from outside sources are materially increased. Nor are the railroads hard pressed for cars for shippers alone, as they are unable to furnish the mills with a sufficient number to move their own material. The Rail rolling programme of the Illinois Steel Company, which in normal periods is fixed two weeks in advance, is now changed from day to day to suit the convenience of the roads. The frequent changing of rolls necessary to meet these changed conditions has materially curtailed the output, but as the storage facilities of the mills are only sufficient to take care of a few

days' production, this expedient must be resorted to. Inquiry has been made for 12,000 tons of Bridge Material by two Western roads, and the Northwestern has placed a contract for 4000 tons with the American Bridge Company for track elevation. Specifications are increasing in volume and the mills are gradually falling behind in deliveries.

Pig Iron.—The car shortage, which is growing more acute, is still further delaying furnace shipments, and that consumers' stocks are practically depleted is indicated by the active spot market which has developed this week. Several Southern operators have advanced prices to \$23.50, Birmingham, for No. 2 for delivery in January and February, although \$23 can still be done. For shipment through the first quarter \$22 is the minimum, and for the second quarter \$19 to \$20 is asked, while for July, August and September \$18.50 to \$19 is quoted. The Allis-Chalmers Company is in the market for 2000 tons for May, June and July, and it is probable that purchases will be made still further in the future. It is reported that two of the largest interests in the South have only 50,000 tons unsold for the last half of the year, and if this proves true continued high prices will prevail. Malleable interests which are now taking contracts for their Finished Material are anxious about their future supply and are buying freely for shipment throughout the year. Heavy contracts have already been placed for the last half, and one large buyer will undoubtedly close for 15,000 tons before the end of the week. For shipment through the first half southern Ohio operators are quoting \$25.30, Chicago, while for the second half \$23 is asked by local producers. The merchant melt of this district will be increased by the blowing in of the new furnace of the Federal Furnace Company next week, but its output for six months has already been sold. Quotations for February and March shipments, f.o.b. Chicago, including the 45c. advance in freight rates on Southern grades, are as follows:

Lake Superior Charcoal.....	\$26.00 to \$26.50
Northern Coke Foundry, No. 1.....	26.00 to 26.50
Northern Coke Foundry, No. 2.....	25.50 to 26.00
Northern Coke Foundry, No. 3.....	25.50 to 26.00
Northern Scotch, No. 1.....	26.00 to 27.00
Ohio Strong Softeners, No. 1.....	26.00 to 26.50
Ohio Strong Softeners, No. 2.....	25.50 to 26.00
Southern Coke, No. 1.....	26.85 to 27.35
Southern Coke, No. 2.....	26.35 to 26.85
Southern Coke, No. 3.....	25.85 to 26.35
Southern Coke, No. 4.....	25.35 to 25.85
Southern Coke, No. 1 Soft.....	26.85 to 27.35
Southern Coke, No. 2 Soft.....	26.35 to 26.85
Southern Gray Forge.....	23.35 to 23.85
Southern Mottled.....	22.85 to 23.35
Malleable Bessemer.....	26.00 to 26.50
Standard Bessemer.....	25.30 to 25.80
Jackson Co. and Kentucky Silvery, 6 %	27.30 to 27.80
Jackson Co. and Kentucky Silvery, 8 %	29.30 to 29.80
Jackson Co. and Kentucky Silvery, 10 %	31.30 to 31.80

Metals.—Copper continues its upward movement, and the volume of local transactions is only limited by the supply. Tin, on the other hand, has suffered a slight decline, which is considered entirely speculative. We revise quotations as follows: Casting Copper, 25 $\frac{1}{4}$ c. to 25 $\frac{3}{4}$ c.; Lake, 25 $\frac{1}{2}$ c. to 26c., in car lots for prompt shipment; small lots, $\frac{1}{4}$ c. to $\frac{3}{4}$ c. higher; Pig Tin, car lots, 44 $\frac{1}{2}$ c.; small lots, 45 $\frac{1}{2}$ c.; Lead, Desilverized, 6.50c. to 6.60c., for 50-ton lots; Corroding, 7.25c. to 7.35c., for 50-ton lots; on car lots, 2 $\frac{1}{4}$ c. per 100 lb. higher; Spelter, 6.75c.; Cookson's Antimony, 28 $\frac{1}{2}$ c., and other grades, 26 $\frac{1}{2}$ c. to 27 $\frac{1}{2}$ c.; Sheet Zinc is \$8.25 list, f.o.b. La Salle, in car lots of 600-lb. casks. On Old Metals we quote: Copper Wire, 19 $\frac{1}{4}$ c.; Heavy Copper, 19 $\frac{1}{2}$ c.; Copper Bottoms, 18 $\frac{1}{2}$ c.; Copper Clips, 19c.; Red Brass, 18 $\frac{1}{2}$ c.; Red Brass Borings, 15 $\frac{1}{4}$ c.; Yellow Brass, 15c.; Yellow Brass Borings, 13 $\frac{1}{4}$ c.; Light Brass, 11 $\frac{1}{4}$ c.; Lead Pipe, 5.50c.; Tea Lead, 5c.; Zinc, 5c.; Pewter, No. 1, 28c.; Tin Foil, 34c.; Block Tin Pipe, 27 $\frac{1}{2}$ c.

Billets and Rods.—Manufacturers of Rods are now quoting \$41, Chicago, for both Chain and Wire Rods, and only occasional car lots are to be had at this price. The demand for Billets is heavy, and Eastern mills are supplying the prompt requirements on the basis of \$38 for Forging grades.

Rails and Track Supplies.—The Pennsylvania Steel Company was awarded a contract for 500 tons of high Tee Rails, and inquiry from other electric roads portends heavy buying in the near future. The Illinois Steel Company is out of the market for 1907, and carries over a large tonnage from 1906. We quote: Angle Bars, accompanying Rail orders, 1907 delivery, 1.65c.; car lots, 1.90c.; Spikes, 2.25c. to 2.50c., according to delivery; Track Bolts, 2.65c. to 2.75c., base, Square Nuts, and 2.80c. to 2.90c., base, Hexagon Nuts. The store prices on Track Supplies range from 0.15c. to 0.20c. above mill prices. Light Rails, 30 to 45 lb. sections, \$33; 25-lb., \$34; 20-lb., \$33; 16-lb., \$36; 12-lb., \$37, f.o.b. mill. Standard Sections, \$28, f.o.b. mill, full freight to destination.

Structural Material.—Notwithstanding the curtailment in building operations there has been no appreciable falling off in new tonnage, as the railroad requirements are almost insatiable. The Northwestern has purchased 4000 tons for track elevation, and two Western roads are in the market

for 12,000 tons. Material from stock is unchanged at 2.05c. to 2.10c., and mill shipments are held as follows: Beams and Channels, 3 to 15 in., inclusive, 1.86 $\frac{1}{2}$ c.; Angles, 3 to 6 in., $\frac{1}{4}$ -in. and heavier, 1.86 $\frac{1}{2}$ c.; larger than 6 in. on one or both legs, 1.96 $\frac{1}{2}$ c.; Beams, larger than 15 in., 1.96 $\frac{1}{2}$ c.; Zees, 3 in. and over, 1.86 $\frac{1}{2}$ c.; Tees, 3 in. and over, 1.91 $\frac{1}{2}$ c., in addition to the usual extras for cutting to extra lengths, punching, coping, bending and other shop work.

Plates.—The output of the Sheared Plate Mill of the Illinois Steel Company is sold through 1907, and a large tonnage has already been taken against the new Universal mill which will be placed in operation in April. Quotations are unchanged, as follows: Tank Plates, $\frac{1}{4}$ -in. and heavier, wider than 6 $\frac{1}{4}$ and up to 100 in. wide, inclusive, car lots, Chicago, 1.76 $\frac{1}{2}$ c. to 1.86 $\frac{1}{2}$ c.; 3-16 in., 1.86 $\frac{1}{2}$ c. to 1.96 $\frac{1}{2}$ c.; Nos. 7 and 8 gauge, 1.91 $\frac{1}{2}$ c. to 2.01 $\frac{1}{2}$ c.; No. 9, 2.01 $\frac{1}{2}$ c. to 2.11 $\frac{1}{2}$ c.; Flange quality, in widths up to 100 in., 1.86 $\frac{1}{2}$ c. to 1.96 $\frac{1}{2}$ c., base, for $\frac{1}{4}$ -in. and heavier, with the same advance for lighter weights; Sketch Plates, Tank quality, 1.86 $\frac{1}{2}$ c. to 1.96 $\frac{1}{2}$ c.; Flange quality, 1.96 $\frac{1}{2}$ c. Store prices on Plates are as follows: Tank Plate, $\frac{1}{4}$ -in. and heavier, up to 72 in. wide, 2c. to 2.10c.; from 72 to 96 in. wide, 2.10c. to 2.20c.; 3-16 in., up to 60 in. wide, 2.10c. to 2.20c.; 72 in. wide, 2.35c. to 2.45c.; No. 8 up to 60 in. wide, 2.15c. to 2.25c.; Flange and Head quality, 0.25c. extra.

Bars.—The Iron Bar market continues exceedingly active, and 1.65c., Pittsburgh, is now the minimum quotation for future shipments. As high as 2.01 $\frac{1}{2}$ c., Chicago, is being secured for prompt requirements, and store prices have advanced to 2.25c. Steel Bars are ruling strong and mill shipments are deferred from three to four months. We quote: Iron Bars, 1.81 $\frac{1}{2}$ c. to 1.86 $\frac{1}{2}$ c.; Steel Bars, 1.76 $\frac{1}{2}$ c., both half extras; Hoops, 2.16 $\frac{1}{2}$ c., extras as per Hoop card; Bands, 1.76 $\frac{1}{2}$ c., as per Bar card, half extras; Soft Steel Angles and Shapes, 1.66 $\frac{1}{2}$ c., half extras. Store prices are as follows: Bar Iron, 2.10c. to 2.25c.; Steel Bars, 2c. to 2.10c.; Steel Bands, 2c., as per Bar card, half extras; Soft Steel Hoops, 2.35c. to 2.45c., full extras.

Sheets.—Rumors of an advance of \$2 have not been officially confirmed, although premiums of \$1 are being paid for early deliveries of the heavier gauges. Mill quotations are unchanged, as follows: Blue Annealed, No. 10, 1.96 $\frac{1}{2}$ c., No. 12, 2.01 $\frac{1}{2}$ c.; No. 14, 2.06 $\frac{1}{2}$ c.; No. 16, 2.16 $\frac{1}{2}$ c.; Box Annealed, Nos. 17 to 21, 2.51 $\frac{1}{2}$ c.; Nos. 22 to 24, 2.56 $\frac{1}{2}$ c.; Nos. 25 and 26, 2.61 $\frac{1}{2}$ c.; No. 27, 2.66 $\frac{1}{2}$ c.; No. 28, 2.76 $\frac{1}{2}$ c.; No. 29, 2.86 $\frac{1}{2}$ c.; No. 30, 2.96 $\frac{1}{2}$ c.; Galvanized Sheets, Nos. 10 to 14, 2.71 $\frac{1}{2}$ c.; Nos. 15 and 16, 2.91 $\frac{1}{2}$ c.; Nos. 17 to 21, 3.06 $\frac{1}{2}$ c.; Nos. 22 to 24, 3.21 $\frac{1}{2}$ c.; Nos. 25 and 26, 3.41 $\frac{1}{2}$ c.; No. 27, 3.61 $\frac{1}{2}$ c.; No. 28, 3.81 $\frac{1}{2}$ c.; No. 30, 4.31 $\frac{1}{2}$ c. Sheets from store, Blue Annealed, No. 12, 2.25c.; No. 14, 2.30c.; No. 16, 2.40c.; Box Annealed, Nos. 18 to 21, 2.70c.; Nos. 22 to 24, 2.75c.; No. 26, 2.80c.; No. 27, 2.85c.; No. 28, 2.95c.; No. 30, 3.35c.; Galvanized from store, Nos. 10 to 20, 3.20c. to 3.25c.; Nos. 22 to 24, 3.45c. to 3.50c.; No. 26, 3.55c. to 3.60c.; No. 27, 3.65c. to 3.85c.; No. 28, 4c.; No. 30, 4.55c. to 4.60c.

Merchant Steel.—Mill specifications, which declined slightly owing to the year end inventories, have again increased in volume, and reflect the continued heavy consumption throughout the West. Quotations are unchanged, as follows: Planished or Smooth Finished Tire Steel, 1.96 $\frac{1}{2}$ c.; Iron Finish, up to 1 $\frac{1}{2}$ x $\frac{1}{2}$ in., 1.91 $\frac{1}{2}$ c.; Iron Finish, 1 $\frac{1}{2}$ x $\frac{1}{2}$ in. and larger, 1.76 $\frac{1}{2}$ c., base; Channels for solid rubber Tires, $\frac{3}{4}$ to 1 in., 2.26 $\frac{1}{2}$ c., and 1 $\frac{1}{2}$ -in. and larger, 2.16 $\frac{1}{2}$ c.; Smooth Finished Machinery Steel, 2.01 $\frac{1}{2}$ c.; Flat Sleigh Shoe, 1.71 $\frac{1}{2}$ c.; Concave and Convex Sleigh Shoe, 2.06 $\frac{1}{2}$ c.; Cutter Shoe, 2.35c.; Toe Calk Steel, 2.31 $\frac{1}{2}$ c.; Railroad Spring, 1.96 $\frac{1}{2}$ c.; Crucible Tool Steel, 6 $\frac{1}{2}$ c. to 8c., and still higher prices are asked on special grades. Shafting, 50 per cent. off in car lots and 45 per cent. in less than car lots, in base territory.

Merchant Pipe.—The recent advance has not affected the demand, and the volume of new orders is almost as heavy as during the height of the Pipe season. The car shortage retards deliveries, and stocks on distributors' floors are badly broken. Discounts on car lots, Chicago, are as follows: Black Steel Pipe, 75.35 on the base sizes, $\frac{3}{4}$ to 6 in., and Galvanized, 65.35. From store in small lots Chicago jobbers quote 72 $\frac{1}{2}$ to 73 per cent. on Black Steel Pipe, $\frac{3}{4}$ to 6 in. Iron Pipe is held at an advance of four to five points above these prices.

Boiler Tubes.—Prior to the recent advance considerable tonnage was placed with the mills, and new business is consequently light. The demand from store is reported abnormal for the season, reflecting the activity of the jobbing boiler shops. Mill quotations are as follows on the base sizes, 2 $\frac{1}{2}$ to 5 in., in carload lots: Steel Tubes, 66.35; Iron, 53.35; Seamless, 50.35; 2 $\frac{1}{2}$ -in. and smaller, and lengths over 18 ft., and 2 $\frac{1}{2}$ -in. and larger, and lengths over 22 ft., 10 per cent. extra. Store prices are however unchanged, as follows:

	Steel.	Iron.	Seamless.
1 to 1 $\frac{1}{2}$ in.....	40	35	42 $\frac{1}{2}$
1 $\frac{1}{2}$ to 2 $\frac{1}{4}$ in.....	50	35	35
2 $\frac{1}{4}$ in.....	52 $\frac{1}{2}$	35	30
2 $\frac{1}{2}$ to 5 in.....	60	47 $\frac{1}{2}$	42 $\frac{1}{2}$
6 in. and larger.....	50	35	..

Cast Iron Pipe.—No contracts of importance have been placed, and inquiry is light. Consumers, with few exceptions, are deferring their purchases on account of the high prices that are prevailing. We quote: Water Pipe, 4 in., \$37 to \$38; 6, 8, 10 and 12 in., \$36 to \$37; over 12 in., \$35 to \$36, with \$1 extra for Gas Pipe.

Coke.—Connellsville Coke has advanced sharply and is now held at \$4 at the ovens, and as high as \$4.50 is secured on car lots in transit. Shipments from the Pocahontas field have ceased almost entirely, owing to the car shortage, and consumers' stocks are low. For immediate shipment, By-Product is selling at \$7.40 f.o.b., Chicago; Connellsville, \$7.15, and Virginia, \$6.50 to \$6.75.

Old Material.—Sales of Car Wheels aggregating 4000 tons have been reported on the basis of \$25, although the offerings this week have been on a slightly lower basis. Railroad Malleable has declined 50c., and agricultural grades are off \$1. The tendency of the entire market is downward, and even Cast Scrap is weaker, notwithstanding the heavy purchases of foundries in this district. The Iron mills are not buying heavily, but are awaiting lower values. Railroad offerings are comparatively light, although the stocks held by dealers are of large proportions. We revise quotations on gross tons, car lots, f.o.b. Chicago, as follows:

Old Iron Rails.....	\$28.00 to \$29.00
Old Steel Rails, 4 ft. and over.....	19.00 to 19.50
Old Steel Rails, less than 4 ft.....	18.00 to 18.50
Heavy Relaying Rails, subject to inspection, 50 lb. and under.....	31.00 to 32.00
Old Car Wheels.....	25.00 to 25.25
Heavy Melting Steel Scrap.....	17.00 to 17.50
Frogs, Switches and Guards.....	18.00 to 18.50
Mixed Steel.....	15.00 to 15.50

The following quotations are per net ton:

Iron Fish Plates.....	\$23.00 to \$23.50
Iron Car Axles.....	27.50 to 28.00
Steel Car Axles.....	23.50 to 24.00
No. 1 Railroad Wrought.....	17.00 to 17.50
No. 2 Railroad Wrought.....	16.00 to 16.50
Railway Springs.....	16.00 to 16.50
Locomotive Tires, smooth.....	16.00 to 16.50
No. 1 Dealers' Forge.....	13.50 to 14.00
Mixed Bushing.....	12.50 to 12.75
Iron Axle Turnings.....	11.00 to 11.50
Soft Steel Axle Turnings.....	11.00 to 11.50
Machine Shop Turnings.....	11.00 to 11.50
Cast Borings.....	9.00 to 9.50
Mixed Borings, &c.....	9.00 to 9.50
No. 1 Mill.....	10.50 to 11.00
No. 2 Mill.....	9.50 to 10.00
No. 1 Rollers, cut to Sheets and Rings.....	12.50 to 13.00
No. 1 Cast Scrap.....	17.00 to 17.50
Stove Plate and Light Cast Scrap.....	13.50 to 14.00
Railroad Malleable.....	17.50 to 18.00
Agricultural Malleable.....	16.00 to 16.50

Birmingham.

BIRMINGHAM, ALA., December 30, 1906.

Pig Iron.—The market has been remarkably active, the holidays having cut but little figure. Prices remain unchanged, varying somewhat according to the condition of order books of sellers, but averaging about as follows: January, \$23.50 to \$24; balance first quarter, \$23; second quarter, \$20 to \$21; last half, \$18.50 to \$19.50. While the buying has been principally for delivery during the second half, a number of large consumers are asking for quotations for near by deliveries and are experiencing considerable trouble in securing the desired grades. There is as much difference of opinion as to what is best to do with reference to covering for third quarter requirements as there was last fall in buying for the first half. Many melters are taking the position that as soon as the crop has been moved cars will become more plentiful and the immense tonnage which has accumulated in furnace yards here will be dumped on consumers, and this would have a tendency to demoralize prices to a certain extent. It is not so much a question of buying the Iron as securing deliveries, and when the consumer's supply becomes more regular he naturally takes a more conservative view of the situation. More than half the furnaces in the district have been banked a part of the past week. In addition to the other troubles which the furnace people have had to contend with it has been raining incessantly for the past week, flooding limestone and dolomite quarries and open mines. The furnaces able to operate must do so on an irregular mixture, causing the production of much off grade Iron. In fact a large percentage of the Iron which has accumulated on the yards here is below a No. 2 Soft, and unless something can be done to secure a more regular supply of raw material the Soft grades will continue to command a premium. There is no material change in the car situation, with the exception of the increased shortage of coal cars, which is causing almost a coal famine. Those who have no contracts are paying 100 per cent. advance over the prices prevailing six months ago.

Cast Iron Pipe.—The market has been rather quiet this week and operations in the manufacturing end have been suspended for several days, owing to inability to control labor at this season. The outlook for the future was never

brighter and the prospects are that 1907 will be the largest year in the history of the business. Prices are exceedingly strong and a further advance will likely be made in the near future. Quotations on Water Pipe are approximately as follows: 4 to 6 in., \$35; 6 to 12 in., \$33; over 12 in., average \$30, with \$1 per ton extra for Gas Pipe.

Old Material.—Quiet but firm is the present status of the Scrap market. Small stocks are in dealers' yards, and as the local demand is such as will take all that can be supplied present prices, it is claimed, will be maintained. Dealers' prices are about as follows, per gross ton, f.o.b. cars here:

Old Iron Rails.....	\$22.00 to \$22.50
Old Iron Axles.....	19.50 to 20.00
Old Steel Axles.....	17.50 to 18.50
Old Car Wheels.....	19.50 to 20.00
No. 1 Railroad Wrought.....	19.50 to 20.00
No. 2 Railroad Wrought.....	15.50 to 16.00
No. 1 Country Wrought.....	15.50 to 16.00
No. 2 Country Wrought.....	12.50 to 13.00
Wrought Pipe and Flues.....	13.00 to 13.50
Railroad Malleable.....	13.00 to 13.50
No. 1 Steel.....	14.00 to 14.50
No. 1 Machinery Cast.....	15.50 to 16.00
Stove Plate and Light Cast.....	11.00 to 11.50
Cast Borings.....	8.00 to 8.50

Philadelphia.

PHILADELPHIA, PA., January 1, 1907.

Considering that this is a holiday week, the amount of business transacted is very satisfactory. It is hardly to be expected that anything important will be done the next two or three weeks, for the reason that there is hardly anything to be had for early delivery, and for what is wanted the last half of the year it is not unlikely that consumers will be inclined to wait until there is some movement which will indicate the probable course of prices later on. Everything is so closely bought up, however, that there can be no selling pressure for some time. Opinions may vary in regard to the last half of the year, but there can be no division of opinion in regard to the first half. This applies not only to Pig Iron, but to finished products generally, although the immediate demand is not particularly strong except for Bar Iron, which is believed to be selling too low in proportion to the cost of production, which has been materially increased during the past 60 days. Taking everything into consideration, it would require a long search to find a time when business was in the prosperous condition it is to-day. Prices of Pig Iron appear to be high, but in view of the light stocks and the enormous consumption it will not be easy to force a reaction, as the law of supply and demand holds good at high prices, the same as it does when prices are low. Consequently, it is hardly possible that there will be any decline until there is a distinct falling off in consumption, of which at the present time there are no indications.

Pig Iron.—Prices of Pig Iron are virtually the same as they were a week ago. On the whole, we should say that the undertone is as strong as ever. There are no declines, while there is a gradual stiffening up, particularly in Foreign Irons. Middlesbrough No. 3 is now being sold at \$23 on dock. There are six or seven cargoes afloat for this port or to be afloat within the next two or three weeks. Most of this Iron is sold to arrive, so that competition with native Irons is not likely to be felt as regards these particular shipments. No. 2 X Foundry is strong, according to the quotations given below, which are for the third and fourth quarters. For the first and second quarters there is practically nothing for sale, so that it is extremely difficult to give quotations, although \$25.75 to \$26.25 would probably be as near the market as can be given, price varying according to tonnage, date for delivery and other conditions which may prevail at the time of sale. It would probably be premature to venture any opinion in regard to the next prices which will be quoted on large lots for delivery during the third and fourth quarters. At the high level of to-day's market it would seem rather optimistic to suggest higher prices in the near future, although that is not regarded as an impossibility, but with the heavy engagements which consumers have made the chances appear to be that the market will remain rather quiet pending further developments. Basic Iron is a little quiet, but strong at the quotations given last week; not much inquiry, nor are supplies likely to be such as to cause any pressure from the selling side. Low Phosphorus is quiet, although there is some inquiry for good sized lots, and quite a number of small sales have been made at about \$28 for local delivery, and for large lots \$27.25 on dock, duty paid, is the usual quotation. The general market may be quoted about as follows for deliveries during the third and fourth quarters, eastern Pennsylvania or adjoining territory, earlier deliveries as above named:

No. 1 X Foundry.....	\$26.00 to \$26.50
No. 2 X Foundry.....	23.50 to 24.25
No. 2 Plain.....	23.00 to 23.50
Standard Gray Forge.....	22.00 to 22.50
Basic.....	23.50 to 24.00
Low Phosphorus.....	27.50 to 28.00
Malleable.....	25.50 to 26.50
Middlesbrough No. 3, on dock.....	22.75 to 23.00
Scotch, on dock.....	24.75 to 25.00

Ferroalloys.—There is a better demand for this class of material and prices are again higher. Sales have been made at \$79 for shipment during first quarter, and \$80 is asked for January shipment. Small lots, spot delivery, command about \$82.

Plates.—Mills in this vicinity made a very short holiday on account of the urgency for prompt shipments. Specifications are very heavy. Prices are firm, but unchanged from last week.

Bars.—There is a very good demand for Refined Iron for forward delivery, but manufacturers are not encouraging business of that character, as they consider the outlook indicates higher rather than lower prices. Meanwhile some business can be done at about 1.88½c., and at that price a good deal of business can be taken for summer delivery, if manufacturers feel inclined to accept orders. Probably in a few days the atmosphere will be somewhat clearer, but in any event the prospect for business is very satisfactory.

Old Material.—There is a very strong undertone, particularly as regards Steel Scrap, although in no case are holders disposed to make concessions. There may be a temporary dullness, but in the meanwhile prices are firm at the figures quoted last week.

Pilling & Crane have been appointed general sales agents for the entire output of Bituminous Coal of the Cambria Coal Mining Company. This company produces the well-known brands of Leland, Lloydell and Portage coals, with a capacity of upward of 1500 tons daily, and has its own Steel cars. Pilling & Crane will handle the business principally through their Philadelphia and New York offices.

Pittsburgh.

PARK BUILDING, January 2, 1907.

Pig Iron.—The market is quiet, but prices are firm. The opinion is general that prices on Pig Iron are about as high as they will go for some little time at least. Consumers are well covered for first quarter and first half delivery, but there is a fair amount of inquiry for second half delivery. As a rule, furnaces quote \$21, at furnace, on Standard Bessemer Iron for last half of the year delivery, and slightly less than this price for Basic. We quote Standard Bessemer for delivery in first quarter at \$22.50 to \$23; for delivery in second quarter \$21.50 to \$22, and for last half of the year \$21, all at Valley furnace. There is not much inquiry for Foundry Iron, Northern brands of No. 2 selling for prompt shipment at \$24.50 to \$25, Valley furnace, and for first quarter delivery at \$23.50 to \$24, Valley furnace. We quote Northern Forge Iron at \$22 to \$22.50, Valley furnace, or \$22.85 to \$23.35, Pittsburgh.

Steel.—There is not much new tonnage being inquired for in Billets or Sheet and Tin Bars, most consumers being covered by contracts. Steel for prompt delivery is hard to get, and continues to bring high prices. We continue to quote 4 x 4 in. Bessemer Billets at \$29.50 to \$30, and Open Hearth Billets \$32.50 to \$33, Pittsburgh. We quote Sheet and Tin Bars in random lengths at \$29.50 to \$30, Pittsburgh, an advance of 50c. a ton being charged for Cut Bars.

(By Mail)

The first week in the new year finds the Iron trade in excellent condition from every point of view, all indications pointing to 1907 as the banner year. Practically all the Pig Iron that the furnaces in the Pittsburgh and Valley districts will make in the first half of the year has been sold at high prices, while the tonnage booked in Finished Iron and Steel is fairly heavy, most of the finishing mills having enough orders to take their output for the first three or four months.

Ferromanganese.—Most large consumers are covered for first half of the year or longer, and the demand is mostly for small lots. We continue to quote 80 per cent. Foreign Ferro at \$85 for prompt shipment, while \$80 to \$82.50 is quoted for forward delivery.

Wire Rods.—We quote nominally \$37 for Bessemer Rods and \$38 for Open Hearth f.o.b., Pittsburgh, but it is still difficult to obtain Rods for prompt delivery, and higher prices would no doubt be paid.

Muck Bar.—The market is quiet. But little Muck Bar has been sold in this market for some months. We quote best grades, made from all Pig Iron, at \$36 to \$37, and from part Scrap at \$34, Pittsburgh.

Skelp.—The mills are sold up for the next three or four months, and consumers are specifying freely. Prices are firm as follows: Grooved Steel Skelp, 1.65c. to 1.70c.; Sheared Steel Skelp, 1.70c. to 1.75c.; Grooved Iron Skelp, 1.75c. to 1.80c.; Sheared Iron Skelp, 1.85c. to 1.90c., Pittsburgh, these prices depending on widths and gauges.

Steel Rails.—The Carnegie Steel Company sold about 25,000 tons of Standard Sections the past week, and also entered a large tonnage of Light Rails. Prices on the latter have been advanced \$1 a ton. We quote Light Rails as follows: \$33 to \$34 for 20 to 45 lb.; \$34 to \$35 for 16-lb., and \$35 to \$36 for 12-lb., at mill. Angle Splice Bars are held at 1.65c., and Standard Section Rails at \$28, at mill.

Structural Material.—Most work placed recently has been for medium lots, but a great deal of large work is in sight, which is expected to be placed soon. All the Structural interests are filled for the next three or four months or longer. Prices are firm, as follows: Beams and Channels, up to 15-in., 1.70c.; over 15-in., 1.80c.; Angles, 3 x 2 x ¼ in. thick up to 6 x 6 in., 1.70c.; 8 x 8 and 7 x 3½ in., 1.80c.; Zees, 3-in. and larger, 1.70c.; Tees, 3-in. and larger, 1.75c. Under the Steel Bar card, Angles, Channels and Tees under 3-in. are 1.60c., base, for Bessemer and Open Hearth, subject to half extras on the Standard Steel Bar card.

Plates.—Tonnage being placed continues heavy and none of the mills are able to make deliveries inside of six weeks to two months, while the Carnegie Steel Company and the other large interests will accept orders only for indefinite delivery. Some of the Eastern mills now quote Plates as high as 1.90c., Pittsburgh, for reasonably prompt shipment. We quote: Tank Plates, ¼ in. thick, 6¼ in. up to 100 in. width, 1.70c. to 1.80c., base, at mills, Pittsburgh. Extras over this price are as follows:

	Extra per 100 lb.
Gauges lighter than ¼-in. to and including 3-16-in.	
Plates on thin edges.....	\$0.10
Gauges Nos. 7 and 8.....	.15
Gauge No. 9.....	.25
Plates over 100 to 110 in.....	.05
Plates over 110 to 115 in.....	.10
Plates over 115 to 120 in.....	.15
Plates over 120 to 125 in.....	.25
Plates over 125 to 130 in.....	.50
Plates over 130 in.....	1.00
All sketches (excepting straight taper Plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.).....	.10
Complete Circles.....	.20
Boller and Flange Steel Plates.....	.10
"A. B. M. A." and ordinary Firebox Steel Plates.....	.20
Still Bottom Steel.....	.30
Marine Steel.....	.40
Shell Grade of Steel is abandoned.	

TERMS.—Net cash 30 days. For anticipated payments a maximum discount may be allowed at the rate of 6 per cent. per annum and for a longer time than 30 days interest shall be charged at the same rate per annum. Invoices paid within 10 days from date thereof, discount of ¼ of 1 per cent. is allowable. Pacific Coast base, 1.60c., f.o.b. Pittsburgh, with all rail tariff rate of freight to destination added, no reduction for rectangular shapes 14 in. wide down to 6 in. of Tank, Ship or Bridge quality.

Sheets.—No announcement has been made by the leading interest of the advance in prices, but this may come early this month. A good deal of tonnage is being placed, and on the heavier gauges some mills ask \$1 a ton premium for prompt delivery. Blue Annealed Sheets, No. 10 gauge and heavier, 1.80c.; Nos. 11 and 12, 1.85c.; Nos. 13 and 14, 1.90c.; Nos. 15 and 16, 2c.; Box Annealed, Nos. 17 to 21, 2.35c.; Nos. 22 to 24, 2.40c.; Nos. 25 and 26, 2.45c.; No. 27, 2.50c.; No. 28, 2.60c.; No. 29, 2.75c.; No. 30, 2.85c. We quote Galvanized Sheets as follows: Nos. 10 and 11, 2.55c.; Nos. 12 and 14, 2.65c.; Nos. 15 and 16, 2.75c.; Nos. 17 to 21, 2.90c.; Nos. 22 and 24, 3.05c.; Nos. 25 and 26, 3.25c.; No. 27, 3.45c.; No. 28, 3.65c.; No. 29, 3.90c., and No. 30, 4.15c. We quote No. 28 Gauge Painted Roofing Sheets at \$1.85 per square, and Galvanized Roofing Sheets, No. 28 gauge, \$3.15 per square for 2-in. corrugations. These prices are for carload lots, jobbers charging the usual advances for small lots from store.

Hoops and Bands.—Practically no new tonnage is being placed, but large consumers are specifying liberally on contracts, and shipments by the mills are heavy. Prices are firm and we quote: Steel Hoops, 2c., and Bands for all purposes at 1.60c., base, half extras, as per Standard Steel card. These prices are for carload lots, f.o.b. Pittsburgh, plus full tariff rail rate to point of delivery, an advance of \$2 a ton being charged for less than carloads.

Tin Plate.—New business is light, but the mills have heavy contracts on their books for Tin Plate for delivery running through first half and into third quarter of this year. No announcement has been made by the leading interest of an advance in prices, but this may come early this month. With raw materials so dear, it is figured that the market on Tin Plate would easily stand another advance. We quote \$3.90 per base box, f.o.b. Pittsburgh, for 14 x 20 100-lb. Cokes, terms 30 days, less 2 per cent. off for cash in 10 days, on which price a rebate of 5c. a box is allowed for carload and larger lots.

Railroad Spikes.—All the mills have their output sold up for the next two or three months and the demand continues heavy. Prices are very firm, and we quote Railroad Spikes at \$2.40 to \$2.50 per 100 lb. on contracts for future delivery, while \$2.65 to \$2.75 is quoted on orders for reasonably prompt delivery.

Merchant Steel.—Consumers are freely specifying, but new business is slack. We quote: Smooth Finished Mer-

chant Steel, 1.85c.; Flat Sleigh Shoe, 1.50c. to 1.55c.; Cutter Shoe, 2.15c. to 2.20c.; Railroad Spring Steel, 1.75c. to 1.80c.; Toe Calk Steel, 2.10c. to 2.15c.; Crucible Tool Steel, 6c. to 8c. and upward, depending on quality. The demand for Shafting is fairly active, the mills being somewhat behind in deliveries. We quote Cold Rolled Shafting at 50 per cent. off in carloads and 45 per cent. in less than carloads, delivered in base territory.

Iron and Steel Bars.—New orders are less than they have been, but all the mills are much behind on shipments on contracts. Local mills continue to quote 1.80c. to 1.85c. on Iron Bars, f.o.b. Pittsburgh, but some of the Eastern mills are offering Bars for delivery in this district at slightly lower prices. We quote Steel Bars at 1.60c. to 1.65c., base, half extras, f.o.b. Pittsburgh, but note that premiums of \$1 and \$2 a ton over these prices are being paid for reasonably prompt shipment.

Spelter.—The demand continues extremely active, especially from makers of Galvanized Sheets. We quote prime grades of Western at 6.50c., St. Louis, equal to 6.62½c., Pittsburgh.

Pipes and Tubes.—Following the three recent advances in prices of Steel Pipe, makers of Iron Pipe have also advanced prices sharply, and are now quoting ¾ to 6 in. at about 72 and 5 per cent. off, Pittsburgh base. Several large contracts for Steel Pipe for oil and gas lines are expected to be placed early in the new year. All the Pipe mills are pretty well sold up for the first two or three months of the year, and on the larger sizes of Line Pipe for a longer period. Official discounts on Steel Pipe, which are shaded about one point or more to the large trade, are as follows:

Merchant Pipe.	Jobbers, carloads.	
	Black.	Galv.
¾ to 1 in.	68	62
1 in.	70	56
1½ in.	72	60
2 to 6 in.	76	66
7 to 12 in.	71	56
Extra strong, plain ends:		
¾ to 1 in.	61	49
1 to 4 in.	68	56
4½ to 8 in.	64	52
Double extra strong, plain ends:		
¾ to 8 in.	57	46

Boiler Tubes.—The demand from the locomotive trade is enormously heavy, and for Merchant Tubes is also quite active. We are advised that the market is very firm, and that all new business being entered by the mills is at the advance of \$2 a ton, made December 20. Official discounts are as follows:

Boiler Tubes.	Iron.	
	Steel.	
1 to 1½ in.	42	48
1½ to 2½ in.	43	60
2½ in.	48	62
2½ to 5 in.	55	68
6 to 13 in.	43	60

Iron and Steel Scrap.—The demand has been extremely light for the past two or three weeks, but is expected to improve this month. Prices on some lines of Iron Scrap are slightly weaker, and it is probable that the quotations might be shaded on a firm offer. Dealers quote about as follows: Heavy Steel Melting Scrap, \$20, for Pittsburgh or Sharon delivery; No. 1 Wrought Scrap, \$21 to \$21.50; No. 2 Wrought Scrap, \$19 to \$19.50; Old Steel Rails, short pieces, 6 ft. and under, for Open Hearth purposes, \$20; Old Steel Rails, rerollers, \$22.50; Wrought Turnings, \$15.50 to \$15.75; Low Phosphorus Melting Stock, \$25; Bundled Sheet Scrap, \$17.25 to \$17.50; Cast Iron Borings are \$13 to \$13.25; Old Car Wheels, \$25; Steel Axles, \$24; No. 1 Cast Scrap, \$20; Railroad Malleable, \$19 to \$19.50; Cast Iron Borings, \$12.75 to \$13; Iron Axles, \$32 to \$33; Stove Plate, \$16 to \$16.50, and Grate Bars, \$15.50. All prices are per gross ton, f.o.b. Pittsburgh, unless otherwise specified.

Coke.—Best grades of Connellsville Furnace Coke for prompt shipment continue to bring \$3.50 to \$3.60 and 72-hr. Foundry about \$4.25 for prompt delivery. On contracts for first half of the year delivery Connellsville Furnace Coke is held at \$3 to \$3.25 and 72-hr. Foundry \$4 to \$4.25 at oven. The output of Coke in the last week of the old year broke all previous records for one week, the Upper and Lower Connellsville regions having turned out 409,830 tons.

The Pittsburgh Automatic Vise & Tool Company has moved its office from 1305 Machesney Building to 713 Washburn Building, Pittsburgh, where it has secured larger quarters, which will enable the increasing business to be handled to better advantage.

The wage advance announced by the Illinois Steel Company recently, we have been advised, affects common labor only and amounts to 10 cents per day.

Cincinnati.

FIFTH AND MAIN STS., January 2, 1907.—(By Telegraph.)

Pig Iron.—A retrospective glance at the situation a year ago reveals the interesting fact that consumers are to-day paying from \$8 to \$9 a ton more for their requirements than they were at that time. And it can be added that the general feeling among the traders is that conditions will gradually grow stronger as the year advances, and that eventually prices will seek a still higher level. Inquiry for the third and fourth quarters continues strong, and quite a considerable tonnage has been sold covering these deliveries. Several of the large implement makers are said to be feeling the market, and stove makers have bought quite freely. Silvery Irons are in strong demand with the supply limited and prices are stiff. Gray Forge is quiet, the supply and demand being about equal. Southern quotations show a slight advance for second quarter, which is gradually dissolving into first quarter prices. We quote the same as last week.

Coke.—Most of the contracts embracing heavy tonnage having been made far into next year, trade is more or less spasmodic. Shipments are not coming forward with the regularity desired, but as yet nothing serious has resulted. Prices are unchanged.

Finished Iron and Steel.—Several of the mills report a strong demand for heavy sections of Structural Shapes, with medium sections in lighter demand. Prices are unchanged but strong.

Old Material.—The market is keeping step with developments in Pig Iron and is exceedingly strong. The demand is good. Prices are continued.

Cleveland.

CLEVELAND, OHIO, December 31, 1906.

Iron Ore.—Little Ore has been sold the past week, but it is expected that the market will become more active after the first of the year, although next season's expected output of standard Ores is pretty well sold. There is some Mesaba non-Bessemer Ore that has not yet been sold, and plenty of Siliceous Ore. Local shippers report that more active operations are going on in the mines than ever before in the winter season. This indicates that a great deal of Ore will be ready for shipment when navigation opens, and that the 1907 output may exceed the past season's record. A scarcity of labor is reported in the mines. Chartering was practically wound up the past week, the last large shipper having contracted. Ore quotations are: Old Range Bessemer, \$5; Mesaba Bessemer, \$4.75; Old Range non-Bessemer, \$4.20; Mesaba non-Bessemer, \$4; Bessemer Siliceous, \$2.75.

Pig Iron.—Foreign Pig Iron became a factor in the local situation the past week. Several fair sized lots were sold at \$25.50, Cleveland, to foundries in this city and vicinity. Inquiries for Iron for the last half continue numerous and heavy sales have been made. The rush made by the foundries to buy for the last half is unusual, and indicates that lower prices are not expected. The market continues firm, and prices are about the same as a week ago. Some furnaces still have a little Iron for the second quarter, but are not anxious to sell. While most dealers quote \$22 to \$23 as the price of Northern Foundry No. 2 for the last half, the same as a week ago, some has been sold for \$21. Third quarter Northern Foundry is selling at from \$22.50 to \$23.50. The quotations for the last half of 1907, f.o.b. Cleveland, are as follows:

Northern Foundry, No. 1	\$22.50 to \$23.50
Northern Foundry, No. 2	22.00 to 23.00
Northern Foundry, No. 3	21.50 to 22.50
Gray Forge	21.00 to 22.00
Basle Iron	21.00 to 22.00
No. 2 Southern	19.00

Coke.—The Coke market is firm, with no change in prices. Deliveries are pretty well up, but good Furnace Coke is scarce at present. Furnace Coke is quoted at \$3.50 to \$3.75 at the ovens for prompt shipment, and Foundry Coke is selling at \$4.25 at the oven.

Finished Material.—The heavy demand for Finished Material of nearly all kinds continues unabated, and the holiday season had practically no effect on the activity of the market. Plates are very firm and many orders have been booked the past week on the basis of 1.70c., Pittsburgh, for future delivery. Higher prices are being asked for early delivery, some mills getting from 1.75c. to 2c. for early shipment. Bars are even scarcer than Plates, and some are being sold at \$2 premium. For future delivery Iron Bars are quoted on the basis of \$1.80c., Pittsburgh, and Steel Bars on the basis of 1.60c., Pittsburgh. Iron Bars are bringing 2c. out of stock in local warehouses, and Steel Bars 1.95c., the same as a week ago. Some small mills in this vicinity that are not tied up by contracts are doing a profitable business selling Plates and Bars at a premium for immediate delivery. Sheets are in fair demand and the majority of dealers look for a further advance in January, although some think that they will go no higher. Ware-

house quotations for Sheets remain unchanged as follows: Blue Annealed, No. 10, 2.25c.; No. 28 One Pass Cold Rolled, 2.90c.; No. 28 Galvanized, 3.90c. Structural Material remains in fair demand, but the situation is easier than in other finished products. Forging Billets are selling around \$40, Pittsburgh, for prompt shipment, and Re-rolling Billets for \$32, Pittsburgh.

Old Material.—The market is weak and few sales have been made. Most kinds of Old Material are plentiful. Prices of some kinds of Scrap have declined 50c. a ton, but dealers are trying to keep up to the high notch reached a few weeks ago. More activity is expected early in the month. The following are dealers' prices to the trade per gross ton, f.o.b., Cleveland.

Old Steel Rails.....	\$19.00 to \$19.75
Old Iron Rails.....	26.50 to 27.00
Old Car Axles.....	29.75 to 30.25
Old Car Wheels.....	21.50 to 22.00
Heavy Melting Steel.....	17.50 to 18.00
Cast Borings.....	10.00 to 10.50
No. 1 Bushelling.....	16.50 to 17.00
No. 1 Railroad Wrought.....	19.50 to 20.00
No. 1 Cast.....	19.50 to 20.00
Iron and Steel Turnings and Drillings.....	13.25 to 13.75

The Samuel M. Shimer Company, dealer in Pig Iron, Iron Ore and Scrap, will shortly open new offices at 36 and 37 Commercial Bank Building, corner of Superior and Bank streets, moving headquarters from the plant in Newburgh.

New York.

NEW YORK, January 2, 1907.

Pig Iron.—We note additional sales of 7000 to 10,000 tons of Basic Pig to a tidewater Steel plant, and 6000 additional to a New York Wire works. A leading pump interest has bought an aggregate of 7000 tons of Foundry Iron, a part of it for the district, and largely for early delivery. There is only moderate new buying of foreign iron. We quote spot Northern Iron, in small lots, \$26.50 to \$27 for No. 1 X, tidewater, and \$25.50 to \$26 for No. 2 X. The business is very limited. For the first half we quote \$26 to \$26.50 for No. 1 Foundry, \$24.50 to \$25 for No. 2 Foundry and \$24 to \$24.50 for No. 2 Plain, tidewater. For the second half we quote No. 1 X \$25 to \$25.50, and No. 2 Foundry \$23.50 to \$24. Southern Iron is quoted \$27 to \$27.50 for No. 2, prompt, \$25 to \$25.50 for No. 2, second quarter, and \$22.50 to \$23 for second half. No. 3 Middlebrough is \$22.50 to \$23, on dock, and Scotch Iron \$24.50 to \$25, on dock.

Steel Rails.—The Rail orders of the week include 4000 tons for the Winona Interurban Railway, 3500 tons for the Springfield & Northeastern, 6000 tons for the Lehigh & Hudson River, 3700 tons for the Johnstown, Ebensburg & Northern, and 2000 tons for the New Orleans & Great Northern. Switch and crossing purchases and other minor contracts amount to 4000 tons more. The Southern mill is understood to be sold up into the early months of 1908. In one case a quotation of \$30 at mill has been made on Rails lately, in view of the attractiveness of Billet business at higher prices.

Structural Material.—In the past week the American Bridge Company has taken five San Francisco contracts, amounting to 4500 tons—the Lent Building, 800 tons; Olympic Club, 1500 tons; Metropolis Bank, 800 tons; Schmidt Building, 400 tons; Delger Building, 1000 tons. A heavy tonnage for San Francisco is looked for from this time on. In New York City the contracts of the week include the German-American Building, William street, 2000 tons; Boehm & Coon Building, on Thirty-fifth street, 3000 tons; Manger Building, 2500 tons. The Buckley Construction Company has been awarded the general contract for the Queens approach to the Blackwell's Island Bridge, but the Steel, 8300 tons, has not been let. Tidewater deliveries, mill shipments, are still made at 1.84½c. for Beams, Channels, Angles and Zees. Sales from stock are made at 2¼c. to 2½c.

Bars.—Refined Bar Iron is in good demand, and is quoted at 1.89½c. to 1.94½c., tidewater. Steel Bars are held at 1.74½c. to 1.84½c., tidewater, depending on date of delivery.

Plates.—Quotations at tidewater are continued at a wide range of prices as follows, owing to the fact that Western mills have not advanced their rates to the level of those asked by Eastern manufacturers: Sheared Tank Plates, 1.84½c. to 2.04½c.; Flange Plates, 1.94½c. to 2.14½c.; Marine Plates, 2.24½c. to 2.44½c.; Firebox Plates, 2.75c. to 3.50c., according to specifications.

Cast Iron Pipe.—The market is quite active for the holiday season, and quotations are continued at \$35 to \$35.50 per net ton, tidewater, for 6-in.

Old Material.—Foundry material, particularly Heavy Cast and Stove Plate, is in strong demand, with light stocks available. Other classes of Scrap are quiet as usual at this season. Prices quoted last week are unchanged.

Metal Market.

NEW YORK, January 2, 1907.

Pig Tin.—A fair business was transacted in spite of the holidays. On December 27 sales were made on the basis of 42.40c., a decline of 40 points from the previous day. December 28 the price was again lower at 42.20c., and this price held on the 31st. Most of the business done was for nearby deliveries. There is a good stock here, statistics showing that the total amount held here on December 31—2122 tons—is 912 tons in excess of that a month ago. The visible supply throughout the world shows an increase from the end of the previous month of 603 tons, it being 12,998 tons, which is only 453 tons below the visible supply December 31, 1905. The total arrivals during December were large, amounting to 4262 tons. The deliveries into consumption were fair, amounting to 3350 tons. There are afloat for American ports 2565 tons. To-day's price is lower at 41.85c., on account of the statistical position.

Copper.—The new year opens with an undiminished demand for Copper. Higher prices are the rule, and for Lake 23½c. to 24¼c. is quoted, for Electrolytic 23½c. to 24c. and for Casting Grades 23.37½c. to 23.87½c. These prices are for future deliveries; for any spot transactions considerable premiums would be demanded. Sales of carload lots of both Lake and Electrolytic at 24½c. are common. Small lots of 10,000 lb. of Lake have been freely taken at 25c. We learn of sales in a retail way at 25½c. to 25¾c. In Europe prices are again higher, the London market closing to-day at £105 15s. for spot and £107 for futures. Best Selected is held at £12 10s. The total exports of Copper in December were 14,023 tons. The year's exports amounted to 204,628 tons, a falling off of 35,000 tons, as compared with the previous year.

Pig Lead.—Prices are very strong, the little spot Lead in the market being held at 6.30c. The St. Louis market is unchanged at 6.05c. to 6.10c. The American Smelting & Refining Company's price, covering old contracts, is 6c.; new business, however, is accepted only at price current on date of shipment. The London market is unchanged from last week at £19 17s. 7d.

Spelter.—Higher prices are the rule and it is difficult to name any for spot, as there seems to be none available in this city. Prompt shipments from the West are held at 6.80c., and future deliveries at 6.65c. to 6.70c., f.o.b. New York. The St. Louis market is a trifle firmer at 6.55c.

Antimony.—The price in Europe is slightly easier, but the market in this country may be nominally quoted at 26c. for Cookson's, 25c. for Hallett's and 24½c. to 25c. for other brands.

Ferroalloys.—The market is strong, Ferrochrome ranging from \$150 per ton upward, according to analysis. Ferro-silicon is held at \$106 to \$108 and Ferromanganese at \$78, all at Atlantic seaboard.

Tin Plate.—The demand is good, and the price of \$4.09 per base box, f.o.b. New York, and \$3.90, f.o.b. Pittsburgh, continues unchanged.

Old Metals.—Prices are unchanged from last week.

Iron and Industrial Stocks.

NEW YORK, January 2, 1907.

A tight money market, incidental to the financial arrangements attending the close of the year, depressed the stock market during the greater part of the week covered since the date of last week's report. Transactions in industrial stocks were light, and in some instances prices showed considerable recession. The lowest point reached in the period under review was on Monday morning, some recovery occurring in the afternoon. The range of prices on active stocks from Thursday to Monday was as follows: United States Steel common 47¼ to 48¼, preferred 103¾ to 104½; Car & Foundry common 42 to 42¾; Locomotive common 71½ to 72½; Steel Foundries preferred 45 to 46; Colorado Fuel 51¼ to 54¼; Pressed Steel common 52½ to 54, preferred 98 to 99; Railway Spring common 51¼ to 52; Republic common 37¼ to 39, preferred 96½ to 99; Sloss-Sheffield common 74 to 75; Cast Iron Pipe common 46 to 46½, preferred 84½ to 85. Last transactions in active stocks up to 1.30 p.m. to-day are reported at the following prices: United States Steel common 48¼, preferred 104½; Car & Foundry common 42¾, preferred 100½; Locomotive common 71½, preferred 109½; Steel Foundries common 10, preferred 45; Colorado Fuel 53; Pressed Steel common 53, preferred 98½; Railway Spring common 51¼; Republic common 39½, preferred 97¼; Sloss-Sheffield common 75; Tennessee Coal 160; United States Cast Iron Pipe common 45¼; Can common 6, preferred 54.

The New York State Steel Company, Buffalo, N. Y., has filed a first mortgage to the Commonwealth Trust Company of Buffalo as trustee, to secure an issue of \$5,000,000 30-year 5 per cent. bonds. Nearly \$3,000,000 of the bonds, it is stated, have already been sold, and the remaining \$2,000,000 will be sold at 93½.

The Machinery Trade.

Bright Prospects for the New Year.

NEW YORK, January 2, 1907.

Practically everything that would tend to round out a most prosperous year's business was either accomplished or commenced during 1906 which may well be characterized as a year of expansion. Starting off as it did with the wheels of industry humming, machine tool builders from 30 to 60 days behind in deliveries, many projects at the point of buying machine tool equipment and others about to be launched, both dealers and manufacturers with well filled order books were already preparing to overcome the difficulty of supplying the large demand. Although many manufacturers had built additions to their plants and some of the important companies had purchased outright completely equipped works or built new ones, they found themselves wholly unable to take care of the business that was being offered and which was expanding rapidly. Prosperity was visible throughout the country, and as the year wore on the demand increased at such a pace that enlarged facilities became necessary. Not many months elapsed before plans were prepared for further extensions and new works, which were equipped and placed in operation at the earliest possible moment, but even with the greatly enlarged capacities manufacturers found that business had grown in much greater proportion than productive capacity, and deliveries were constantly getting further into the future. At the end of the third quarter of the year works of the more prominent machinery builders were sold six months ahead, and a few had their output taken for 1907. To carry on the extensive volume of business capitalization was largely increased. The year was the most lucrative in the history of the trade, as materially higher prices for tools were obtained and substantial premiums were offered for early delivery. It will be remembered that in the previous year prices were advanced from 5 to 10 per cent. to cover additional cost of manufacture of tools of new design for high speed steel, motor drives and other special attachments. This advance was followed by another of the same amount early in 1906 to cover additional cost of raw material. As the latter became scarcer and advanced in price other advances on machinery were made, increasing the cost from 15 to 20 per cent. The insufficient supply of competent labor and slow deliveries of raw material prevented a larger production. The unprecedented demand for machinery was the natural result of the prosperous condition prevailing in practically every line of business, and was a continuous and healthy growth of the expansion of trade that was noticeable in 1905. Business was not spasmodic, but each successive week experienced a handsome increase, and there were no off months. While the bulk of business was made up of small transactions, extensive lists covered by large corporations were especially numerous. The demand emanated from about every source where an iron working tool is used. The railroads, which greatly increased their shop facilities, were heavy purchasers, as were the steel companies and manufacturers of steel cars and other rolling stock.

Manufacturers early in the year 1906 realized that the condition of trade demanded some action on their part toward organization, with a view to correcting evils which had arisen between both buyers and sellers as a result of the demand for equipment. Accordingly trade agreements were made and associations were formed which did much toward making competition fair for all concerned. The organizing was not confined to the manufacturers alone, but the dealers got together and mutual ideas were exchanged and mutual interests discussed. The year saw the completion of plans for a joint convention of the American Supply and Machinery Manufacturers' Association, National Supply and Machinery Dealers' Association and the Southern Supply and Machinery Dealers' Association. The crane men got together and organized a movement toward regulating the abuse of blue prints and specifications, and the Corliss engine manufacturers organized the Corliss Engine Manufacturers' Association of America. A local organization known as the M. and S. Credit Association was also formed. There is now talk of a high speed engine manufacturers' association, and a plan to concentrate the machinery dealers in New York under one roof and organize a machinery club has been formulated and promises to meet with success.

The new year opens with capacities taken for months, good prices prevailing, plans under way for further expansion and a heavy demand for all classes of machinery. Surely, this augurs well for a continual good business for 1907, which is not only indicated by the number of new

plants and additions under way and projected, but also by the great amount of machinery that has been purchased but will not be delivered for months to come and therefore can be classed in next year's business. Manufacturers who have carefully reviewed the past and have taken up and weighed every condition affecting the future of the market say that they can discover nothing that is likely to have an adverse effect, but, on the contrary, find evidence of a still greater business. A good deal of buying is expected by the railroads, some of whom have already completed extensive lists of tools which will likely be issued at an early date, while others have large shops under construction for which the equipment has not yet been purchased. The two innovations in railroading—electrification and use of steel cars—were carried on with vigor, but changes of such magnitude take time and the machinery trade has not yet received the large business that accrues from such work. Undoubtedly shops will have to be specially equipped to make repairs to electrical equipment and steel cars, and it is thought that the year's programmes will include such machinery. One railroad acknowledges the necessity of shops for steel car repairs, and it is rumored that another is already at work on plans for works not only for repairs, but for building the cars. The railroads have lately bought thousands of steel cars, and much business is expected from the builders of that class of rolling stock, many of whom are extending or erecting new works. Purchases of rolling mill equipment and cranes will undoubtedly be heavy, as will those of conveying machinery. Many are realizing more and more the saving in cost of handling by cranes and are preparing to install such equipment. The recent action of the crane manufacturers in refusing to furnish blue prints and afterward make parts of cranes at the order of those who wish to do part of the construction in their own plants has done much toward regulating factory production and facilitating deliveries. The only spots on the horizon are the possible advance of raw material to a prohibitive price and the exorbitant demand of labor. As long as these prevail at their present rates no alarm is felt. One large corporation, however, has not planned extensive construction work for the new year on account of the high cost of and difficulty to secure raw material and labor. One of the serious questions confronting the trade is that of deliveries, which are far in the future. Manufacturers are, however, adding to their equipment, and it is hoped that within a few months these will ease up considerably.

The indications are that power requirements this year will be even larger than they were during the year just closed, but it is thought that the power men will have a better chance to cope with the situation. During the year 1906 many of the larger builders of engines succeeded in getting additional manufacturing equipment, and they say they can give better terms now as to deliveries. The many projected electric railroad lines and subways will help the demand for power apparatus, and other large improvements, especially those contemplated by the United States Steel Corporation, give indications that the year will be a big one. Builders of smaller engines are keeping up with the demand fairly well, and it can be said that they are doing better in that respect than machine tool builders. The organization of the Corliss Engine Builders' Association of America during the past year probably will assist in the regulation of prices, and the conditions which confronted the manufacturers last year regarding promiscuous price cutting will undoubtedly be eliminated.

Prospective Machinery Requirements of the Railroads.

A large amount of construction work already commenced that will be carried to completion within the next few months, and the number of extensions and new plants projected, can be readily seen by glancing backward on the important projects which have come to the general notice of the trade.

Of railroad work, one of the most important from the viewpoint of prospective purchases of mechanical equipment are probably those planned by the New York Central Lines, which include the New York Central & Hudson River, West Shore, Lake Shore & Michigan Southern and the Michigan Central railroads. The New York Central has a large amount of work under way at its yards in New York, and for this point will buy considerable new machinery. The list of machinery that is required has been prepared and would have been sent to the trade some time ago had it not been for the fact that it will take many more months to complete the construction work, and it was not thought necessary to get bids in. This list will probably be one of those that the trade will be asked to bid on at an early date. The requirements of the Michigan Central will be mostly in connection with the tunnel it is building under the Detroit River, contract for the construction of which was placed in September of last year. Bids were received some time ago for the mechanical equipment to operate the entire electric zone, but no contracts have been placed. The order for this electric equipment will probably be one of the first to be awarded this year and will cover water tube boilers, turbo generators, electric traveling cranes, boiler feed pumps,

horizontal feed water heaters, induction motors, mechanical stokers, coal and ash handling machinery, submerged vertical centrifugal pumps and other apparatus. In connection with this undertaking repair shops are likely to be constructed which will entail the expenditure of considerable money for mechanical equipment.

Another one of the Vanderbilt Lines which will issue specifications within the next few months for a large amount of machine tool equipment is the Cleveland, Cincinnati, Chicago & St. Louis Railroad, which is constructing an entirely new plant at Indianapolis, Ind., for which an appropriation of \$1,500,000 has been made to be expended next year, and it is estimated that \$500,000 additional will be required before the work is completed. Contracts have been let for the construction of this plant, which will include 20 buildings, the main one of which is to be 214 x 572 ft. There will be a blacksmith shop, 126 x 340 ft.; boiler shop, 126 x 564 ft.; tank pilot and cab shop, 76 x 504 ft.; coach shop, 177 x 442 ft.; power house, 116 x 140 ft.; foundry, 104 x 254 ft., and car shop, 153 x 450 ft. Contracts for the main power equipment were placed in December.

The Delaware, Lackawanna & Western Railroad will without question carry on its improvement work of various kinds during the next year on about the same scale as it has in the past five or six years, and will probably buy as much new equipment in 1907 as it did during 1906. The company's expenditures for new engines and cars, as far as it has let contracts, will be in the neighborhood of \$2,500,000, and in addition it has planned to spend between \$500,000 and \$750,000 on new shop buildings and equipment. The trade has been following the movements of the company closely for some time, expecting to receive specifications for machine tools almost any week, and it will not be surprising if the company sends out a substantial list very shortly. The erection of a large machine shop and other buildings at Scranton, Pa., have been authorized, which will be used for new construction and repair work. This building will be 364 x 758 ft., and will mean the doubling of the shop capacity at that point.

The programmes for 1907 machinery equipment are being prepared by the different divisions of the Pennsylvania Railroad, and indications are that the road will purchase about as much new machinery this coming year as it did the past. The company purchased a very large amount of machinery the last 12 months for equipping new additions and it is likely that a great deal of new shop construction will be undertaken this spring. It is reported that the company contemplates the erection of a steel car plant at its Altoona works.

While the Philadelphia & Reading Railroad has not made public its plans for new shop construction, it is expected that plans for some new buildings will be forthcoming in the near future. In conjunction with other railroads, this company has added largely to its steel car equipment, and is in need of a plant to make repairs to this class of rolling stock.

It is understood that the Baltimore & Ohio Railroad has prepared its annual programme of machine tool requirements for 1907, which can be looked for at almost any time. This list, it is thought, will be quite extensive, and will include several tools which were in the list it issued last June and which were not purchased.

The New York, New Haven & Hartford Railroad, which is building large repair shops at Readville, Mass., for which contracts for equipment were placed in the latter part of the summer, is understood to be contemplating the erection of new shops somewhere on the Western division of its system.

Arrangements are being made by the Nashville, Chattanooga & St. Louis Railroad for rebuilding its shops at Atlanta, Ga., which were destroyed by fire some time ago.

The Erie Railroad does not contemplate doing extensive construction work during the coming year, but has under consideration the purchase of 3000 steel cars, to cost approximately \$3,600,000. During the past year this company has purchased a great deal of mechanical equipment, and it is thought will not buy much additional beyond its regular requirements of new tools for replacement. The plans of the company are being held back to some extent by the scarcity of material and labor and the consequent high prices, and if these should ease up within the next six months it is possible that the company will take up the question of improvements.

The Chesapeake & Ohio Railroad has not yet prepared plans for enlargement of its shops. It has, however, ordered equipment approximately \$5,000,000 in value.

The Central of Georgia Railroad has purchased a large plot of land near Macon, Ga., but as yet no definite plans have been prepared for the machine and car shops which it intends locating there.

Plans have not yet been completed for the new shops which the Seaboard Air Line intends to erect at Jacksonville, Fla. These plans are expected to be completed early in the year.

Plans for several of the buildings which will comprise the new shops of the Grand Trunk Railroad at Battle Creek, Mich., have been favorably passed upon by the com-

pany and bids are in for the construction. The buildings to be erected immediately will include locomotive shop, 170 x 817 ft.; blacksmith shop, 100 x 225 ft., and store and oil house. Other buildings, the plans for which have not been definitely decided, are power house, foundry, carpenter shop, frog shop and truck shop. It is expected that the equipment for the first three shops will be purchased shortly, but purchases for the entire plant are likely to extend over quite a period. The total cost of the plant has been estimated at over \$2,000,000.

Within a short time contracts are expected to be placed for the machinery for equipping the new shops of the Chicago & Eastern Illinois Railroad at Danville, Ill. The improvements at that point involve the doubling of the boiler shop, machine and blacksmith shop and storehouse. Other less important buildings will be constructed.

The Southern Railroad is making improvements to its Knoxville shops to cost \$200,000, including equipment.

The Union Pacific Railroad is building new shops at Omaha, Neb., at a cost of \$200,000, not including the equipment.

The Mississippi Central Railroad is erecting new shops at Hattiesburg, Miss., including a car shop, 151 x 243 ft. and machine shop, 151 x 220 ft.

The Minneapolis, St. Paul & Sault Ste. Marie Railroad has prepared plans for the erection of new boiler shops at Minneapolis, Minn., the main building to be 119 x 202 ft.

The New York, Ontario & Western Railroad, with main offices at 56 Beaver street, New York, will build five miles of track from Strongtown to Young's Gap during the year, and will make some other improvements in that vicinity. The company will not do much in the line of shop construction, as about \$60,000 has been spent at Norwich in that kind of work, and some improvements are now under way at Middletown, which will be completed before the year is out. They include an addition to the boiler shop and the erection of a blacksmith shop. A large paint shop is also being erected, and the second half of a large power house designed for Middletown will be built. The power equipment, however, has been contracted for.

The New York, Auburn & Lansing Railroad is building a third rail high speed trolley line from Ithaca to Auburn, with a power house at Genoa, N. Y., of about 1000 kw. The company has not purchased all its equipment for this improvement, which will include the installation of water tube boilers, pumps, condensers, &c., and equipment for a machine shop to be erected in conjunction with the car barn at the Auburn end of the line. Plans are in charge of W. L. Fairchild, consulting engineer, 15 Broad street, New York.

It is expected that the New York, Westchester & Boston Railroad Company, main offices at 30 Broad street, New York, will complete its projected lines within the next 18 months, and in addition to a large amount of construction work which is yet to be done, the company will build a machine shop capable of taking care of about 200 cars. The improvements which are to be made at Mt. Vernon will include blacksmith shop and all that goes to make up a general repair plant. The company's power house is now in course of erection.

New Industrial Plants and Additions.

The business obtained last year from industrial companies was phenomenal, and the purchases of many will extend well into the new year, particularly such companies as the General Electric Company, which has large improvements under way. Within the past few months the company closed a long list of machine tools for its Schenectady works and issued a list of tools for its new Lynn shops, aggregating \$250,000. In addition to the improvements now under way, it is probable that the Lynn works will be further enlarged on account of the congestion existing in the departments there, and it is likely that its Pittsfield plant will be materially increased in size. It is said that the company's architects have prepared plans for six new buildings, to be erected at the latter works, where it is rumored improvements will be made at an expenditure of \$1,000,000.

The Chicago Pneumatic Tool Company will probably increase the capacity of all its plants, and will purchase some new equipment for completing the improvements now being made to its air compressor works at Franklin, Pa.

During the past year large quantities of machinery were purchased by the Standard Roller Bearing Company, Philadelphia, Pa., which about doubled its plant by the erection of new buildings. In the latter part of the year the company purchased the entire plant and real estate of the Pennsylvania Iron Works Company, adjoining its property, which will give it five additional factory buildings, with a total of over 110,000 sq. ft. of floor space and real estate 120 x 1600 ft. These buildings will be equipped with a full line of machinery at a cost of over \$200,000, but as the Standard Company will not secure possession of the buildings for some little time, it has not prepared specifications for the machinery that it will purchase. The company has taken possession of the foundry, 100 x 200 ft., in which will be installed modern machinery for making crucible steel, brass and gray iron castings. Within the past few months

the company began the erection of a concrete building, 100 x 200 ft., five stories high, which will be devoted exclusively to the manufacture of annular ball bearings, automobiles, &c. Other improvements include the completion of a crucible steel casting plant, iron and brass foundry and a drop forging plant, 100 x 150 ft. The company now has in operation the largest and most complete plant in the world for the manufacture of automobile axles and ball and roller bearings.

The Otto Gas Engine Works, Philadelphia, Pa., is proceeding with the erection of its new plant at Wilmington, Del., where a large site was purchased a year or more ago. The main building at this new plant will be 140 x 600 ft., and will be equipped for larger construction work than the company's facilities at Philadelphia will permit.

One of the important industrial enterprises launched last year is the construction of new works by the Arthur Koppel Company, whose main offices in this country are located at 66-68 Broad street, New York. This project is one which saw but its beginning in 1906, and which can be looked to for much more important development during the ensuing year. The Arthur Koppel Company is probably better known in European countries and other parts of the world than in this country. Having several large plants in Continental Europe devoted to the manufacture of industrial railroad equipment, and, in fact, standard gauge railroad equipment as well, it has assumed an important position in the supplying of such materials to all parts of the world. The materials sold in this country have heretofore been shipped here in partly finished state, being assembled at the company's shops at Hoboken, N. J. It is now proposed to manufacture throughout complete equipments, including cars of every description, portable track, rails, switches and all accessories, in this country. For this purpose a very large plant is to be built. The project includes the establishment of a new town in Beaver County, Pa., about 35 miles northwest of Pittsburgh. The town has been named Koppel. For the location of the new plant 1000 acres of land have been set aside in this town, and the work of erecting the plant has begun. In order to get a portion of the plant in operation as quickly as possible the works are being constructed in sections, the first of which is now nearing completion. The buildings of this section include an erecting shop, light car shop, switch shop and power plant. Details of the company's plans beyond this first section have not been announced definitely. Enough is known, however, to indicate that the company contemplates carrying out the project on the scale of its European operations, where its plants rank among the largest industrial establishments.

A new plant is to be erected at Buffalo, N. Y., by the Buffalo Brake Beam Company, for the manufacture of brake beams for railroad car and other railroad appliances. The company has purchased a 5-acre tract of land on which the plant will be located, the main structure to be 80 x 300 ft. The equipment in the present plant is to be moved to the new one when completed, but in addition a considerable amount of new machinery will be installed. C. J. Bacher, resident manager at Buffalo, will have charge of the equipment of the new plant.

The American Locomotive Company has not made many plans for its year's improvements as yet, but the corporation will, of course, do some construction work. A great deal of work was completed by this company during the year and much was begun. The steel castings plant which was talked of early last year and decided upon by the company's directors has not been built, and the coming year will probably see its commencement. The foundry at Providence, R. I., recently destroyed by fire, will be rebuilt, but no definite plans have been made for that work as yet. The large additions now being made to the steam shovel department of the Richmond, Va., plant will, it is expected, be completed during the year, and within a few months the additions at Dunkirk and Schenectady, N. Y., will be completed. The company has purchased considerable property in Canada, which is to be used for an addition to the company's plant there, for which some provisions have been made. During the year the plant at Providence, R. I., for the manufacture of Berleit automobiles was about finished, but it is understood that the plant is being worked to the fullest capacity, and it is possible that the success of the company's road machines will necessitate further enlargements there.

One of the large projects which is expected will be completed early in the spring is the plant to be erected at Bristol, Pa., by the Standard Cast Iron Pipe & Foundry Company, which was organized by Philadelphia interests closely identified with the American Pipe Mfg. Company. John Hamer of Burlington, N. J., has completed the plans, which call for four large foundries, a machine shop and other necessary buildings. This plant will have a daily capacity of 300 tons of cast iron pipe for water and gas and general castings.

About March 1 the erection of a cast iron pipe plant will be started by I. Levenstein & Co., Davenport, Iowa, which will consist of a foundry, 100 x 200 ft., with an addition,

40 x 60 ft., for pattern shop, and an addition, 20 x 40 ft., for core making.

The United States Cast Iron Pipe & Foundry Company is now figuring on the construction of its proposed new machine shop at Burlington, N. J., where, during the year, two large foundries and a power house have been built. While no time has been set for beginning work, it is likely that construction will be commenced early in the spring.

A new plant is being constructed at Elmira, N. Y., by the Kennedy Valve Mfg. Company which will take the place of its present plant at Cossackie, N. Y. The plant will include an iron foundry, 95 x 308 ft.; machine shop, 95 x 300 ft., and pattern shop and pattern storage building, 50 x 300 ft. Other structures include a brass machine shop, brass foundry, assembling, testing and tool departments, power house and smaller buildings. A great deal of equipment will be moved to the new plant from Cossackie, but in addition there will be installed considerable in the way of new machinery.

Arrangements will shortly be made by the Graham Nut Company, Pittsburgh, Pa., for the new equipment it will have to purchase to equip the additions it intends building to its plant at Nevill Island, Pa. At the latter place two new buildings will be constructed, one 60 x 200 ft. and the other 95 x 100 ft., in which will be installed entirely new equipment, consisting of several hot pressed, nut machines, cold punched nut machines and several classes of bolt heading machines of the latest type. The buildings will be of brick and steel, and when completed will practically double the present output.

The plant of the Avoca Wheel Company, Avoca, N. Y., which was destroyed by fire some time ago, is to be rebuilt and the manufacture of wheels is to be resumed on an extensive scale. While arrangements have not yet been fully completed nor have plans for the new buildings been perfected, the plant will be about 50 x 300 ft. It is the intention to begin construction as soon as the weather will permit.

The Malsby Machinery Company, Atlanta, Ga., has purchased property on which it contemplates erecting a new plant two or three stories, 62 x 151 ft. It is the intention to commence building operations next summer.

The Globe Foundry Company, Port Chester, N. Y., is erecting a new plant at Huntington, W. Va., the molding shop of which will be 150 x 400 ft. The plant is to be equipped with modern machinery for the manufacture of soil pipe and fittings, steam and hot water boilers and cast iron radiation.

The Keystone Driller Company, Beaver Falls, Pa., has purchased a large tract of land adjoining its present property, a good part of which will be covered by new buildings, the construction to be undertaken next spring. The sizes and number of the new buildings have not yet been fully decided, but a complete steel foundry will probably be included.

In the spring the Spencer-Kellogg Company, Buffalo, N. Y., intends to erect a new plant in Minneapolis, Minn., which will consist of 48 20-plate Buckeye hydraulic presses, with the usual equipment of pumps, accumulators, transformers, heaters, trimmers, &c., for the making of linseed oil, in conjunction with which will be erected an oil refinery. The building will be fireproof, and the machinery will be operated by electric motors, the power to be furnished either by gas engine generator units fed by gas producers, or by electricity taken from power lines now in operation in that city.

The Morton Iron Works, Brooklyn, N. Y., will develop plans this winter for a new plant which will probably be erected in the spring. The new plant will probably be erected at some point in Pennsylvania where the company will have better facilities than it has at its present location.

The Standard Sanitary Mfg. Company, Pittsburgh, Pa., has had under consideration for some time the erection of a new plant at Camden, N. J., where the company purchased a large site. The erection of the plant has been postponed for the present because of transportation facilities at that point, which are not considered the best. The company has been doing a very large business, and is in need of additional facilities, and it is possible that early in the year the company will take up the matter and erect a plant either on that site or at another location.

Another plant which is likely to be started early in the spring is the one planned by the Oscar Barnett Foundry Company, Newark, N. J., which has purchased a site of 10 acres.

The American Tobacco Company, New York, has plans for five new buildings, to be erected in Chicago at a cost of about \$1,000,000.

James Ackroyd & Son, Albany, N. Y., are to erect a new building which will be equipped with modern machinery for the manufacture of skylights and architectural sheet iron work.

The Buffalo & Susquehanna Iron Company, Buffalo, N. Y., which recently purchased the Hiawatha mines, near Norway, Mich., is planning to equip this property in a first class manner, commensurate with the needs of the amount of ore which it is expected will be produced. New buildings

will be erected and considerable new machinery will be installed.

C. H. A. Dissinger & Brother, Wrightsville, Pa., intend to move their business to Columbia, Pa., where a new plant will be erected.

The Savage Arms Company, Utica, N. Y., which recently enlarged its plant by 20,000 sq. ft. of additional space, has under consideration the erection of other buildings.

The Gleason Works, Rochester, N. Y., will probably go ahead with the erection of additional buildings this spring, it having during the year only completed and placed in operation the foundry. The company has a 20-acre site, on which it intends eventually to have an entire new plant.

The Carter Motor Car Corporation, Washington, D. C., is to erect a new plant, which will be equipped with modern machinery, to be operated by electric motors. When completed the plant will cover about 5 acres of ground.

A new plant will be erected in the spring by the Allentown Portland Cement Company, Allentown, Pa., which was recently incorporated with a capital stock of \$2,000,000. The new plant will have a daily capacity of 4000 barrels.

The Guggenheimer interests have under way the erection of so many new works at their mines in the West that they are likely to figure as extensive buyers of machinery during the next year. Within the past couple of months it was decided to build a large smelting plant at Ely, Nev., while the copper smelting plant at Point San Bruno, Cal., and a large smelter at Salt Lake City, Utah, are under construction.

Important additions are to be made to the plant of the American & British Mfg. Company at Providence, R. I., to equip which a large amount of machinery will be required. The specifications for the equipment have not yet been prepared, but they will include, besides the usual variety of machine tools, several 15 and 25 ton electric traveling cranes. One of the buildings will be approximately 104 x 250 ft. and the other 40 x 420 ft. Later a new foundry and erecting shop for the Diesel engine department will be built.

The Youngstown Furnace & Supply Company, Youngstown, Ohio, has decided to purchase a site at Warren, Ohio, on which it will build a complete plant.

The Standard Foundry & Steel Casting Company has just received bids for the erection of a new plant at Jeanette, Pa.

The Midland Condenser Company, recently incorporated at Buffalo, N. Y., has purchased a site, on which it will erect a plant to consist of an erecting and machine shop, 100 x 200 ft., for the manufacture of feed water heaters, condensers, &c.

The Hatfield Motor Vehicle Company, Cortland, N. Y., will require a considerable number of machine tools for the plant it is to establish for the manufacture of automobiles.

The Mergenthaler Linotype Company is likely to erect a new plant on a site somewhere in the vicinity of New York. The company has very largely increased its plant at Brooklyn within the past few months, and contemplates the installation of a brass foundry.

Improvements to Steel Works.

It is expected that there will be a large demand for rolling mill equipment and general machinery from steel making plants, judging from the inquiries now before the trade and the improvements projected. The largest purchaser during the year will be the United States Steel Corporation, whose plans for 1907, as outlined in *The Iron Age*, indicate that it will do a great deal in the construction line. In addition to the building of the great works at Gary, Ind., some of the more important improvements will include the construction of two 450-ton blast furnaces and 12 open hearth furnaces, together with a blooming mill, bar mills and ingot mold factory at the Carnegie Steel Company's plant. There will be a new structural mill at the Clairton Works, a 16-in. merchant bar mill at the Duquesne Works, and a 40,000-gal. pumping engine at the Illinois Steel Company's plant. Plans also include improvements to the Lorain (Ohio) Works of the National Tube Company, and a plant for the manufacture of insulating wire for the American Steel & Wire Company. There will be new rod mills at Worcester, Mass.; four new hot mills at the Guernsey Works, Cambridge, Ohio, of the American Sheet & Tin Plate Company, and a new bridge works for the American Bridge Company at Elmira, N. Y. It is understood that the company expects to complete the more important projects within the next 18 months, but the works at Gary, Ind., will require a longer time, as will the new construction at the Ohio Works of the Carnegie Steel Company. The proposed \$900,000 warehouse at Newark, N. J., will involve the purchase of considerable machinery.

The Seneca Iron & Steel Company, Buffalo, N. Y., has contracted with the Lewis Foundry & Machine Company, Pittsburgh, for the erection of a new sheet mill plant to contain five hot mills, one roughing mill and three cold mills, which is expected will be completed during the summer.

The Ludlum Steel & Spring Company, Pompton, N. J., is erecting at Watervleat, N. Y., two buildings, 75 x 300 ft.,

which will be in operation before next fall as a steel spring plant.

The Bethlehem Steel Company will during the year complete the additions to its forging department, and the new structural mill will also be put into operation, it is thought.

The Tennessee Coal, Iron & Railroad Company is making large improvements at Ensley, Ala., to cost about \$2,500,000, which include the installation of a new converter, new open hearth furnaces, new boilers and additional gas producers. The company is also making alterations in its roll mill and the steam plant is being enlarged. These improvements, it is expected, will be completed during the year and the additions put into operation.

The Crucible Steel Company of America, Pittsburgh, Pa., has plans for a new spring plant which have not been entirely completed, and it is expected before long the trade will learn of the details.

The Etna Steel & Iron Company, Etna, Ga., has plans for the development of large ore properties near Rome, Ga., which may result in some construction work.

The Knoxville Iron Company, Knoxville, Tenn., may begin the construction of a steel plant during the year for which plans have not been entirely completed.

The James A. Spargo Wire Company, Rome, N. Y., expects to be in the market next summer for 450-hp. engine and generator and boilers for its new steel mill, 150 x 400 ft., which is to be erected on a 12-acre site purchased a short time ago.

Steel Car Plants.

The demand for steel cars last year was far beyond the capacity of the plants, and many companies which have plants for producing that class of equipment largely increased their facilities, and other companies which manufacture wooden cars commenced or prepared to begin the construction of steel cars. The American Car & Foundry Company built new steel car plants at Madison, Ill., and St. Louis, Mo., the former of which is now producing from 40 to 50 cars a day, while the latter will be placed in operation next March.

In the latter part of the year the Standard Steel Car Company, which has works at Butler, Pa., prepared for the construction of a large steel car plant at Hammond, Ind., where a site of 380 acres was purchased. The plant will have a daily capacity of 100 steel and wooden cars, and will consist of a steel car shop, 160 x 2000 ft.; truck shop, 80 x 600 ft.; wooden car shop, 80 x 1800 ft.; paint shop, 80 x 1500 ft.; power house, 80 x 800 ft., and a number of smaller buildings.

The Pullman Company, Chicago, Ill., has announced its intention to erect a steel car plant, the ultimate cost of which will range from \$5,000,000 to \$10,000,000.

The Danville Car Company, Danville, Ill., recently organized with a capital stock of \$250,000, has placed contracts for the erection of a new electric and freight car plant, to consist of an erecting shop, 240 x 320 ft.; woodworking shop, 60 x 180 ft.; cabinet shop, 60 x 180 ft.; engine room, 60 x 120 ft.; truck shop, 60 x 120 ft.; blacksmith shop, 60 x 120 ft.; machine shop, 60 x 120 ft.; freight repair shop and other smaller buildings.

The Seattle Car Mfg. Company, Seattle, Wash., has selected a site near Renton, a suburb of Seattle, where it will construct a new plant, to be equipped with modern machinery and to have a daily capacity of 10 cars. In addition, all classes of standard railway equipment will be produced.

Power and Tunnel Work.

It is expected that the present year will see the commencement of the seven new subways projected in New York, and probably it will bring forth other improvements in the same line. The Hudson tunnels will be completed, and it is expected work on the Steinway tunnel will be finished, as well as the Pennsylvania Railroad's tunnel under the Hudson River.

The Hudson Companies will during the year complete a large power house in Jersey City to supply power for the Hudson tunnels, and an extensive power house and system of railroad shops will be built at Harrison, N. J., for the Pennsylvania Railroad's rapid transit line from Newark and to supply electrical power over part of the railroad system adjacent to New York. These projects, together with the proposition to build 50 miles of subway in New York, will call for considerable machinery during the year and will fill in the trade any void that might come about through the cessation of demands for equipment by the tunnel builders.

A plan which it is thought will materialize during the year is that of the Boston & Cape Cod Canal Company to spend \$6,000,000 in building a canal across Cape Cod, to shorten the water route between Boston and New York.

Enormous contracts have been let within the last month or two for work on the Erie Barge Canal, and it is expected the contractors will come into the market for much in the line of construction equipment. The largest contracts were granted to the Great Lakes Construction Company, Buffalo, N. Y.; Atlantic Gulf & Pacific Company, New York, and the Kinser Construction Company, Chicago, Ill. A greater portion of the work will be done on the Champlain Canal.

The entire project involves the expenditure of \$101,000,000, and a number of contracts are still pending and will, it is expected, be given out during the year.

The scheme to tunnel the Delaware River and establish a railroad between Philadelphia and Camden, N. J., has been taken up by the Delaware Subway Company. Wolf Brothers & Co., Philadelphia, are financing the project and will, it is expected, carry it through. Plans for the proposed tunnel are under way and will be finished shortly.

The construction of a water supply system in the Catskills for the City of New York will result in some machinery demands, especially in the way of outdoor equipment, and, of course, considerable power machinery will be required. The aqueduct will cost \$161,000,000, and the work, it is thought, will be got under way during the year.

Expansion of Canadian Industries.

Business in foreign countries also showed a material expansion the past year, and inquiries from that source were larger than usual. A great deal of business was secured from Japan and also from Canada. The steady expansion of trade in the latter country caused many companies in this country to erect branch plants, while many new projects have been undertaken, particularly in the way of works supplying material for railroads and other large corporations using finished iron and steel products. Several steel plants and works for building cars and car wheels are projected, and if the Canadian Parliament decides upon a shipbuilding bounty in all probability new shipbuilding plants will be constructed. Two of these are under contemplation, but it is probable that nothing will be done until the question of a bounty is settled.

One of the most important projects to be taken up is the new plant to be constructed at Edmonton by the Grand Trunk Pacific Railroad, whose headquarters are in Montreal. This company is vigorously pushing the construction of its railroad, and by next spring it hopes to have at least 1000 miles of road bed in the hands of the contractors. The company intends to take up the construction of new shops about the middle of next spring, when plans will be prepared.

The Grand Trunk Railroad intends to move its Toronto repair shop from the Esplanade to New Toronto, where large buildings will be erected for not only the regular repair work, but also for the manufacture of steel switches, frogs and crossings.

The Intercolonial Railroad has just opened bids for new locomotive shops, to be erected at its yards at Moncton, N. B., where it has in course of construction a large group of buildings, the main structure of which is 176 x 408 ft. The foundations for the shops have been completed and some of the buildings are well under way, but it is not thought that building operations will be carried on on an extensive scale until the spring.

The National Car Company, Limited, Halifax, N. S., recently incorporated with a capital stock of \$1,000,000, intends to erect a plant for the construction of from 15 to 25 cars per day. Plans and specifications will probably be completed within the next month or so, as it is the intention to proceed with the construction of the plant in the early spring. John R. Macleod is secretary.

A movement is on foot for the establishment of a car wheel plant in Montreal, Can., at the head of which is understood to be Graham Fraser.

Rhodes, Curry & Co., Limited, Amherst, N. S., which lately increased the capacity of its plant, contemplates the doubling of its axle shop.

The Ontario Iron & Steel Company, Toronto, Ont., is erecting a large steel plant and rolling mill at Welland, Ont., where it owns a site covering 60 acres. The equipment will include two 25-ton open hearth furnaces, three 12 and 22 in. trains and a steel casting plant containing one 20-ton open hearth furnace. The mills are to be electrically driven, and it is expected that the plant will be in operation in July.

The Peterborough Steel Rolling Mills Company, Peterborough, Ont., contemplates the erection of a new plant.

Jenkins Brothers, New York, manufacturers of valves, are to erect a plant at St. Paul, near Montreal, Can., the main building of which will be 50 x 200 ft. There will also be a foundry, 64 x 150 ft., and an engine and boiler house, 45 x 60 ft. Later the company expects to build a second foundry, 60 x 100 ft.

The Berlin Machine Company, Beloit, Wis., will erect a large plant at Hamilton, Ont., where it has purchased a site of 16½ acres. There will be a machine shop, 200 x 253 ft.; foundry, 72 x 200 ft., and other smaller buildings.

The Canadian Iron & Foundry Company, Limited, Fort William, Ont., which operates a half dozen plants for the manufacture of cast iron pipe, valves, car wheels, castings, &c., is to erect a new plant in which will be installed a large quantity of electrical equipment, direct driven pressure blowers, machine shop and foundry equipment, electric traveling cranes, pneumatic hoists, compressors, &c. The main office is in the Canadian Life Building, Montreal.

The Canadian Forge Company, Welland, Ont., an aux-

iliary of the Titusville Forge Company, Titusville, Pa., has under way the construction of a new plant for the manufacture of forgings of all descriptions.

The Gilson Mfg. Company, Port Washington, Wis., is to build a new plant at Guelph, Ont., which will be equipped with modern machinery for the manufacture of gasoline engines, agricultural machinery, &c.

The Standard Fitting & Valve Company, Guelph, Ont., recently incorporated with a capital stock of \$100,000, has purchased a site on which it will erect a plant for the manufacture of plumbers' supplies and wrought iron pipe. The company will spend \$30,000 in the erection of buildings, and will install machinery at a cost of \$75,000. John M. Taylor, manager of the Taylor-Forbes Company, is at the head of the Standard Company.

The Western Iron Works, Winnipeg, Man., is to spend \$65,000 in the construction of a new plant, to consist of a machine shop, foundry, structural shop and ornamental iron department.

The Philip Carey Mfg. Company, Cincinnati, Ohio, is to erect a new plant at Hamilton, Ont., plans for which have not been completed.

The Anglo-Newfoundland Development Company has been organized by English capitalists and will erect a number of pulp and paper plants in Newfoundland. George F. Hardy, New York, is consulting engineer.

Government Purchases.

The Government has continued to purchase large quantities of machinery, not only for the navy yards and War Department shops, but also for carrying on the work of constructing the Isthmian Canal, and from present indications it is likely that the Government will be a heavy purchaser of machinery throughout the coming year.

In connection with work on the Panama Canal, the opening of bids on January 12 for its completion by private corporations will be of considerable interest, in view of the fact that it will probably shift the purchases of a great deal of the machinery from the Government to private companies. If, as is likely, contracts will be awarded to several companies for doing portions of the work, it will mean that many companies will have to buy a great deal in the way of contractors' machinery.

According to the report of the Chief of the Bureau of Yards and Docks, Navy Department, a great deal will be done toward improving the shops, the estimate for maintenance and for improvements of the navy yards and stations being placed at \$11,474,118. This report recommends the consolidation of heating, lighting and power plants, the equipment of an auxiliary vessel as a machine shop, the construction of additional dry docks and the construction of new shops in the yards. An estimate is submitted for an appropriation of \$538,000 for improvements to the New York Navy Yard as follows: Electric plant extensions, \$25,000; heating system extensions, \$20,000; additional railroad equipment, \$5000; electric motors, \$7000; central power plant, \$140,000; coppersmith shop for steam engineering, \$97,000; brass foundry, \$25,000.

The Week.

Owing to the advance in the cost of labor and material, the Garwood Foundry & Machine Company, Garwood, N. J., has withdrawn prices on its Bernhard boilers. New prices will be submitted on application.

Authoritative announcement is made of the purchase of the Ridgway Machine Tool Company, Ridgway, Pa., by the Niles-Bement-Pond Company, which is now filling orders from the Ridgway plant. All of the Ridgway people's contracts will be carried out, but fortunately for the purchasing company that plant is not so crowded with business as some of its other plants, and consequently considerable of the new business will be manufactured there. The Ridgway Machine Tool Company, a subsidiary company, has been incorporated, with offices in Jersey City, and an authorized capital stock of \$1,000,000 to operate the recently acquired plant. As yet the Niles-Bement-Pond Company has made no construction plans for the new year, although it is expected that the Niles plant at Hamilton, Ohio, will be added to to some extent, and an addition 28 x 354 ft. now in course of construction at the Pond Works at Plainfield, N. J., will be completed.

From the spirit in which the citizens of Halifax, N. S., have received the proposition to establish car shops and a wood working plant in that city, it looks as if the proposition would go through and that the next few months will see construction work started. The stock has already been over subscribed and all that is necessary to secure the plant is for the city to guarantee \$125,000 of bonds. If the bond issue is successful in passing the city council the company will require a full line of wood working machinery and complete equipment for car shops. It is proposed to move the wood working plant of Silliker Bros., Limited, from Amherst, N. S., to Halifax and to add a complete car building plant, a new company to be organized with an authorized capital stock of \$500,000 to operate the new works. The buildings are to cover 3 acres and cost about \$200,000.

The annual output of cars will be 1500 in addition to the wood production. The management is to be retained by the Messrs. Silliker, who take \$125,000 of the paid up capital stock, the citizens taking a like amount, which with the bond issue of \$125,000 will give the company a paid in capital of \$375,000.

Plans are under way for a plant to be erected at Hampton Junction, N. J., by the Gardner Valve Mfg. Company, New York. The company will install a 100-hp. high speed engine, to be direct connected to a generator, and some 25 or 30 motors will be purchased for driving machinery. The company's plant will include a one-story iron foundry, 70 x 200 ft., two-story brass foundry, 42 x 50 ft., and a two-story machine shop, 72 x 150 ft. All the machinery arrangements will be made from the company's office at 95 Liberty street.

J. G. White & Co., 46 Exchange place, New York, are purchasing considerable machinery just now for their construction work in the Philippines. As has been stated in *The Iron Age*, the company is constructing a system of railroads covering the islands of Panay, Negros and Cebu, which involves an expenditure of \$30,000,000 or more. On each of the three islands, in addition to the railroad construction, the company will install machine shops, blacksmith shop and general repair system, and it is for this work that the machinery is now being bought. It is thought that the company will make expenditures from time to time well along into next year. In addition to the Philippine contract the company has under way considerable railroad construction work for the Bolivian government, where a number of new lines are being built to connect the large rubber country of the eastern district of Bolivia and the Brazilian dependencies of Acre.

The Mutual Box Company, Utica, N. Y., is erecting a one-story brick plant, 102 x 318 ft., and Victor Adams of Little Falls, N. Y., who is the consulting engineer, will purchase the company's equipment, including a 215-hp. engine.

Circular No. 347 will be issued within the next week by the Isthmian Canal Commission, asking bids for one 350-hp. noncondensing engine, one 200-kw. engine type revolving field generator and other apparatus for the Culebra electric light plant.

The Isthmian Canal Commission will receive bids until January 14 for one lathe and other supplies, under Circular No. 346.

The Isthmian Canal Commission will receive bids until January 12, Circular No. 345, for two suction dredges.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until January 22 for motor, drill press, lathe, emery grinder and other supplies.

Chicago Machinery Market.

CHICAGO, ILL., December 31, 1906.

Aside from the unprecedented industrial development of this district in the manufacture of heavier forms of iron and steel, extensions and additions to the shop facilities of western roads were the most important factors that contributed to the abnormal activity of the Chicago machinery trade during the year which has just come to a close. Manufacturing capacity in the more highly finished lines, which proved inadequate to the requirements, necessitated installations of tools to increase production, which were prodigious in their aggregate. Nor has there been any decline in the demand from these sources as the new operations projected and under way are of sufficient magnitude to insure a large volume of business to machine tool and equipment manufacturers throughout the ensuing year. Purchases of power equipment, rolling mill, ore handling and other machinery for the new plant of the Indiana Steel Company, Gary, Ind., involved expenditures of close to \$10,000,000—the rail mill contract, which was awarded as a whole to the United Engineering & Foundry Company, Pittsburgh, having been the largest single order for rolling mill machinery ever placed. Contracts for engines and motors were of similar proportions, and a like expenditure has been authorized for doubling the initial capacity in 1907. For extensions to the South Works of the Illinois Steel Company, large purchases of power equipment were made, and the finishing capacity increased by the installation of two new mills. As there are no rolling mill manufacturers in this district all of the contracts were awarded to Eastern companies, and the volume of this business was of such magnitude that their output for the year has already been sold.

The use of larger and more powerful locomotives has presented many new problems in the repair shops of Western roads, as the tools were neither adapted to nor of sufficient size for the work on the larger and more intricate locomotive parts, and replacements were consequently numerous.

In addition, the repair facilities of nearly all of the roads were inadequate to the requirements of the heavy additions to rolling stock, which not only led to extensions to existing plants but also to the erection of new shops.

The Chicago, Milwaukee & St. Paul Railroad practically doubled its equipment at Milwaukee by the erection of a new wheel foundry and extensions to the machine, blacksmith and locomotive shops. The appropriation for this work amounted to \$2,500,000, the last purchase of tools having recently been made and involved approximately \$200,000. The Burnside shops of the Illinois Central were also enlarged and the replacements reached a total never before approached. New work now under way includes shops for the Grand Trunk at Battle Creek, Mich., and the Big Four near Indianapolis, and when completed will represent a combined outlay of about \$5,000,000. At Danville the Chicago & Eastern Illinois Railroad is doubling its repair facilities and the purchase of new tools will be of no small proportions.

The Allis-Chalmers Company, Milwaukee, notwithstanding heavy purchases in December, 1906, figured as one of the largest buyers of the year in this market, while the International Harvester Company bought freely for all its plants. The Griffin Car Wheel Company built a new wheel foundry at Kensington to meet the requirements of the Pullman Company, and the latter is having plans prepared for the erection of a \$5,000,000 car plant. At Hammond, Ind., the Standard Steel Car Company is erecting a car works, which will have an output of 100 steel cars daily, and another large manufacturer is considering the erection of a similar plant in that vicinity. Projected operations of the Corn Products Refining Company involve the erection of the largest manufacturing establishment of its kind in the world, and the equipment will cost nearly \$2,000,000.

Rapid advances made by the machine tool builders reflected the increased cost of manufacture due to the upward movement of raw materials and the demands of labor for higher wages.

The acquisition of the property bounded by Madison, Fulton, Congress and Clinton streets, by the Chicago & Northwestern Railroad Company for a large depot and terminal will completely wipe out "Machinery Row," the center of Chicago's machinery trade. New locations have already been secured by several dealers and a number of manufacturers have acquired sites outside of the city, where property can be secured at a minimum cost. The natural tendency among the dealers' and manufacturers' representatives is to drift southward, as the west side between the river and Halsted street is already completely occupied.

Within a short time the old plant of the Indianapolis Bridge & Iron Company, Indianapolis, Ind., will be dismantled, and the proprietors, J. D. Adams & Co., will occupy a new and commodious factory now being constructed at Belmont avenue and the Big Four tracks. The business of this firm will henceforth be conducted under the name of J. D. Adams & Co., and the product of the new factory will consist of high-class road graders and road making tools and machinery. The bridge building operations conducted in the old plant will be discontinued. The new plant will occupy a ground space of 84 x 240 ft., and will be equipped with a full line of suitable machinery, including lathes, planers, bulldozer, wood-working machinery, compressors, &c., for which they will be in the market in the near future.

The Coffeyville Machine Shop & Foundry Company, Coffeyville, Kan., has been organized with a capital of \$50,000, for the purpose of operating a jobbing foundry and machine shop. The new plant will be erected and contracts for considerable machinery will shortly be placed. F. O. Weis is president; George Francis, vice-president; Frank Yale, secretary, and W. H. Shepard, treasurer.

Catalogues Wanted.—The Fort Wayne Electric Works, Fort Wayne, Ind., expects to be in the market in the near future for a lot of machine tools, such as lathes, shapers, boring mills, drill presses of all kinds, screw machines, turret lathes, pattern makers' lathes, milling machines, blacksmith shop equipment, carpenter and wood workers' equipment, &c., and is anxious to receive up-to-date catalogues covering most of these machine tools which are to be used principally for small work, such as lamps, meters, &c. Most of its expansion of capacity will be along that line.

Cleveland Machinery Market.

CLEVELAND, OHIO, December 31, 1906.

Sales of machine tools and general machinery have been quite heavy the past week, the demand being chiefly for one or two tools to increase the capacity of a plant. No inquiries for extensive equipment for new plants are being received at present by local dealers but they look for inquiries along that line at the first of the year. Deliveries are no more prompt than they were. Prices are stiffening and manufacturers that had not previously ordered an ad-

vance have set out new price schedules to go into effect January 1. Some dealers think, however, that the limit has been reached in prices of machines that have already been advanced and that prices will go no higher. The demand for elevating and conveying machinery for coal and ore mines is unusually large at present. There are also large orders coming for machinery for cement plants. The demand for lighter machinery for automobile plants does not seem to diminish. From numerous inquiries received concerning machine tools and general machinery for future delivery local makers look for a very busy year ahead. Labor conditions have improved somewhat here, the large influx of foreigners having helped to supply the demand for unskilled workmen. Machinery manufacturers are hampered by delay in deliveries of castings, nearly all the foundries being fully three months behind with their orders and many of them being forced to turn away business. Further advances in the price of castings are expected. Nearly all the local machinery makers are running their plants to their fullest capacity.

A large number of manufacturers will go on the Cleveland Chamber of Commerce trade extension tour to Mexico. The party will leave here on a special train February 19 and arrive home March 8, after visiting the principal cities in the southern republic and spending a day in the tropics, where dinner will be served on a coffee plantation. Three days will be spent in Mexico City and shorter stops will be made in other cities. Among the local manufacturers who will go on the trip are the following: Charles E. Adams, Cleveland Hardware Company; W. H. Hunt, Cleveland Hydraulic Pressed Brick Company; W. C. Connelly, Cleveland Steam Boiler Works; F. F. Prentiss and J. D. Cox, Cleveland Twist Drill Company; W. P. Champney, Eberhard Mfg. Company; George T. McIntosh, McIntosh Hardware Corporation; A. W. Henn, National Acme Mfg. Company; H. H. Hackenberg, National Carbon Company; W. D. B. Alexander, National Screw & Tack Company; F. C. Osborn, Osborn Engineering Company; F. G. Smith, Osborn Mfg. Company; H. A. Higgins, Standard Tool Company; W. R. Warner and Ambrose Swasey, Warner & Swasey Company; and A. W. Ellenberger, Worden Tool Company. Nearly all the married members of the party will be accompanied by their wives.

The National Tool Company, manufacturer of milling cutters, has the erection of a large new plant under consideration. It has options on several sites and definite action will probably be taken at the annual meeting of the stockholders this month or early in February. This company has just installed three new lathes and two Garvin milling machines and is building several special machines in its own plant. It is rushed with orders and is receiving many inquiries for future delivery.

Plans for a \$100,000 addition to the plant of the Dean Electric Company, Elyria, are being prepared by the Osborn Engineering Company. Work on the addition will be started in the spring. The company will purchase considerable new machinery including 500-hp. engine, boilers and generators.

A cement plant to cost about \$800,000, and with a capacity of 3500 barrels a day will be erected soon at Concord, Cal., by the Henry Cowell Lime & Cement Company, San Francisco. Plans are now being prepared by the Osborn Engineering Company of this city. The engineers will soon award contracts for motors, elevating and conveying machinery, electrical equipment, cars, &c. The buildings will be of steel frame construction. The contracts for them have not yet been awarded. The contracts have already been let for the crushing machinery, tube mills, kiln dryers, and coolers.

Plans are now being prepared for the plant of the Royal Motor Car Company. The main building will be about 200 x 600 ft., two stories high. The company intends to turn out about 15 automobiles a day. Considerable new machinery will be purchased to be used in addition to the machinery equipment now in use in the present plant. The site that has been purchased covers 10 acres.

The National Acme Mfg. Company is running its plant 24 hr. a day to supply the heavy demand for screw machines and cannot promise delivery of machines within an average of six months. The company has doubled the capacity of its plant the past year and is enlarging its screw department.

The Cady Machine Company, manufacturer of power punch presses, has moved into a new factory on East Sixty-ninth place. The company has recently purchased a 42-in. Pond planer and a traveling crane and is in the market for two lathes and a milling machine.

Bardons & Oliver, manufacturers of machine tools, are in the market for an automatic screw machine. They report that the demand is on small orders for one and two machines and that many orders are coming in for delivery late in the spring.

The Loew Supply & Mfg. Company will probably be in

the market for some new machinery the first of the year. This company has just received some large orders for open and closed feed water heaters for power plants, including two 2000-hp. for the Northern Ohio Traction Company, Akron, and one 2000-hp. for Heath & Milligan, Chicago. The company has recently put on the market a power pipe threading machine.

The Central Steel Castings Company, Columbus, Ohio, recently incorporated, has purchased a site upon which it will erect a new plant. The company hopes to have its plans completed this month, and it then expects to send out inquiries for the necessary equipment. Letters should be addressed to John L. V. Banney, Post Office box 427.

New England Machinery Market.

WORCESTER, MASS., January 2, 1907.

Every one connected with the machine tool business, no matter how remotely and in every kindred line, begins the new year with unbounded confidence that 1907 will see a continuance of the wonderful prosperity that has characterized the trade for the past nine or ten months. The demand holds up just as strongly as ever. Nothing is able to discourage it, not even the state of deliveries which under any ordinary circumstances would surely have its effect upon the market. Consequently New Year's Day is a very bright one for the machinery trade.

There will be advances in prices on the part of some of the machine tool builders with the beginning of the year. It is already known that one important line is ready to make an increase, and the dealers are confident that the upward tendency has not yet reached the climax of its application to the price-lists, and some of them have been advising their customers not to wait too long before placing orders that are projected. It will not be surprising to see practically the entire market take an upward step through the lines of standard tools, though the advance may not be so general as that.

The difficulty which New England foundries are having in getting their iron, because of lack of freight facilities, is becoming more and more pronounced. They cannot get deliveries, and in some cases have been compelled to go into the market for foreign iron due for early delivery, though they have orders in for domestic iron, which would have been filled long ago were it not for the railroads. The same condition applies to other raw materials which have to be brought from a distance by rail.

The spring meeting of the National Machine Tool Builders' Association will be held on Tuesday and Wednesday, May 7 and 8. The place will be the Chamberlain Hotel, Old Point Comfort, which is directly across the river from the grounds of the Jamestown Exposition, which are easily reached by ferry. The date has been formally fixed by President E. M. Woodward and Secretary Paul E. Montanus.

In these times of great prosperity an exception to the rule constitutes almost an anomaly. Such a one is the Maine shipbuilding industry, which has launched but 10,000 tons during 1906, comprising all classes of vessels and including only 10 of over 300 tons register. Formerly 70,000 tons a year was no uncommon total. Even Bath had a very small business during 1906, amounting to only about 6350 tons, as compared with an usual 15,000 to 30,000. The demand for wooden vessels has fallen off greatly, which is probably largely responsible for the decadence of what was once a great industry.

J. E. Snyder & Son, Worcester, Mass., manufacturers of upright drills, are to erect a new shop on land recently purchased at the corner of Parker and Dewey streets, in that city. The building will be of reinforced concrete, 90 x 170 ft. and one story. A 50-hp. engine has been ordered from the Fitchburg Engine Works, Fitchburg, Mass., and boilers from the Stewart Boiler Works, Worcester. A traveling crane of from 2 to 3 tons capacity will be installed, but it is not decided what crane will be used, though it will probably be of the power type. The contract for the building has been let, and preliminary work of excavation has begun. The firm has been compelled to provide these larger quarters because of the impossibility of expanding farther in the building at 100 Beacon street, one floor of which is now occupied. Instead of the present 7000 sq. ft. of floor space, the new building will provide about 17,000. Every facility will be provided to enable the firm to pursue the most modern methods of economical manufacturing. J. E. Snyder established a business for himself in 1882, specializing from the first on upright drills, a line from which he has never departed. New machine tools have already been ordered. It is expected that the present working force of 40 men will be doubled as soon as the firm is in its new shop, the present demand affording ample opportunity to utilize that number of men in taking care of current business.

The W. & S. Mfg. Company, Worcester, Mass., successor to Wilson & Smith, manufacturer of sheet metal work, is planning to go into drawing metal if the necessary machin-

ery can be procured within reasonable time. The company would like to receive information concerning drawing presses and double acting presses of medium size, for which it will be in the market if deliveries can be made to accommodate the projected new line.

The Wm. H. Page Boiler Company, Exeter, N. H., is to remove its business to a new plant, which will be erected at Meadville, Pa. The company operates works at Exeter and at Norwich, Conn., and both will be vacated when the Meadville plant is ready for occupancy. Work on the buildings has not yet begun, but will be in a short time, and it is expected that within a year the transfer of the business will have been effected. Five large buildings will be constructed. The company manufactures steam and hot water heating boilers and radiators.

The Brown-Talbot Machine Company, Salem, Mass., manufacturer of combustion engines, is about to make additions to its manufacturing capacity. Three new buildings will be erected, one 40 x 64 ft. and one story, another 24 x 32 ft. and two stories, and a third 18 x 24 ft. and one story. It is understood that the company will require some new machine tool equipment.

The Saxon Machine Company, 32 Main street, Holyoke, Mass., has been organized to manufacture grinding machinery. The company is marketing a cylinder grinder with boring attachment, surface grinders formerly manufactured by the Goddard Machine Company, which has gone out of business, and also the automatic knife grinder and guide bar grinder which formed parts of the line of the Goddard Company. All the work is at present being done under contract, under the supervision of the former superintendent of the Goddard Machine Company. J. H. Wylie, the treasurer of the company, was the manager of the Goddard Company. The company has no definite plans for establishing a shop of its own.

Trade Publications.

Gas Producers.—Amsler Engineering Company, Pittsburgh, Pa. Catalogue. Illustrations and descriptive matter explain the various advantages claimed for the Amsler gas producers. Tables giving comparative tests of steam engines and producer gas engines, and relative costs of fuel with different types of engines are also included.

Railroad, Mill and Factory Supplies.—Walter A. Zelnicker Supply Company, 400 North Fourth street, St. Louis, Mo. A miscellaneous assortment of circulars. These deal with hand-shaved, second-growth handles for hammers, picks, &c.; conical fire pails; Stempel gold medal fire extinguishers; indestructible roofing for steep or flat roofs; rail benders; brooms, brushes and dusters; Aldon car and engine replacers; double clutch car movers; oakum; car door rollers; sand stoves; portable hydraulic wheel presses; portable derricks, and lumber crayons.

Power Transmitting Machinery.—Geo. V. Cresson Company, Philadelphia. Catalogue B. Size 6 x 9 in.; pages 350. Cloth binding. This is the company's latest issue and is a very complete catalogue on the subject. It embodies much of useful information and deserves commendation for its convenient arrangement and artistic composition. In the forepart, under the heading "Engineering Notes," are given data and formulae useful in the construction and erection of power transmitting machinery. Then follow illustrations from photographs and line drawings with tables of dimensions and specifications of all of the articles listed. These include shafting and everything associated with it, such as collars, couplings, shaft hangers, bearings, pillow blocks, pedestals, floor stands, pulleys of all kinds, flywheels and hand wheels; everything pertaining to rope transmission, such as grooved wheels and pulleys, mule stands, belt tighteners, &c. (a considerable amount of useful information on the multiple or English and continuous or American systems is here included); machine molded gears, helical, bevel, worm and spur and ratchet and sprocket wheels. The last few pages illustrate and describe the Buchanan rock and ore breaker, Buchanan all-steel crusher, patent plaster crusher, Buchanan's style B rolls, revolving screens and Buchanan's magnetic separators.

Washington Diary for 1907.—Washington Coal & Coke Company, Dawson, Pa.; sales office, Pittsburgh, Pa. An annual publication of this company, size 7 x 9½ in., with full leather binding. Heavy record paper is used, and each page contains space for two days. The pages preceding the diary space contain census figures, postal information and various tables of weights and measures.

Pocket Memorandum.—American Bridge Company, 42 Broadway, New York City. A pocket size, leather bound memorandum, with spaces for seven days to the page. Contains also half-tone views of a number of structures recently erected by the American Bridge Company, together with tables of weights and dimensions and other data of standard structural shapes.

Asbestos Packing.—H. W. Johns-Manville Company, 100 William street, New York City. Circular. Pertains to the line of J-M sheet packings, and points out to the employer and engineer the benefits accruing from the use of these packings.

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HARDWARE

THE year 1906 was one of opportunity for all in the Hardware business—an opportunity so great as to be beyond all previous experience and expectation and equaled only by the promise of 1907. Naturally it was a year of great surprises and striking characteristics. Among the latter none were more marked than the enormous and unprecedented demand for goods of all kinds. It was a demand so great as hopelessly to swamp manufacturers and to clog up the railroads with a congestion from which they are still suffering; yet withal it was a demand built upon the rock of natural consumption and not upon the shifting sands of speculation. Its two causes were easily found in our greatly increased population, constantly supplemented by an enormous immigration, and in the bountiful yield of our harvests. Nothing has been more clearly demonstrated during the past 12 months than the fact that, whatever be the importance of our mining and manufacturing industries, the commercial prosperity of our country still depends primarily and principally upon the crops. In one section alone—the great Southwest—the enormous volume of crops brought an era of railroad building without parallel, and the flow of population has brought a new State into our Union and transformed into a rich farming community a country that two-score of years ago was looked upon as an irreclaimable desert.

In all the multiplied hum of industry there was but rarely the discordant note of labor troubles, for labor as a whole was occupied, well paid and content. Yet it may be well doubted if the theory of organized labor made any great progress during the year, and when it strayed into the field of politics it met with sore defeat. The scarcity of labor—both skilled and unskilled—has and continues to be a marked feature and one that is fraught with much significance for the future. We are importing hordes of illiterate and ignorant foreigners, and whenever the wheels of prosperity begin to slow down we shall have a serious problem as to what to do with all this unassimilated and undigested material.

The year has demonstrated that the apprehensions as to overproduction of manufactured articles have been, thus far at least, unfounded; population and demand have grown so much faster than machinery that it will take some time for the latter to catch up. With good wages and all labor well employed it is obvious that consumption per capita has outstripped all previous records, and that it has also permanently got upon a somewhat higher plane and will never again willingly revert to the scanty fare of past hard times. For good or for ill, the population of our country has quite definitely determined to share to a greater personal extent than ever before in the good things that our native land produces or that come to us from foreign shores.

The disposition among all classes of trade—manufacturers, jobbers and retailers—to work in harmony and to share in the general feast of good things was never more marked than in the past 12 months, and, indeed, it would have been the extremity of folly under such conditions to allow personal feeling or antagonism to prevent taking advantage of the opportunity of a lifetime. A glance over the situation shows, however, that but small

real progress was made in Hardware, because manufacturers were so busy filling orders with the accustomed wares that new things had to be laid aside for the time being. Necessity and poverty still remain the greatest incentives to invention.

Nothing was more marked in a conservative way than the general tendency up to the latter part of the year of the manufacturers to restrain advances and to prevent an undue boom. That this was the long-headed policy was obvious enough, but the growing scarcity in raw materials and their consequently appreciating prices cause the fear that the rising tide of prices will finally break down the barriers and carry everything away in a flood that can only result disastrously in the end. The great strain upon all of our natural resources has naturally called attention to the extent and nature of these resources, and we are beginning to modify the adjectives that formerly described our ore and coal deposits, as we realize the tremendous drafts that are being made upon them. We gloss the matter over by saying that the pace we are going in the way of consumption is abnormal and cannot last; yet we know in our sober second thought that although this pace may slow down presently for a time, after all it but marks the beginning of a much more rapid depletion of our resources. In nothing during the past year was this feeling more marked than in the steadily growing substitution of steel and iron for wood, and the increasing difficulty of securing adequate timber for many purposes. The great increase in the cost of lumber has emphasized this fact as nothing else could.

Less marked in many ways and yet more steadily bringing itself into prominence as each month went on and prices constantly climbed, was probably the deepest and most underlying problem of all—as to how far and to what extent the whole great movement owed a large part of its inception and energy to the steadily increasing flood of gold and as to whether we were not entering upon a permanent new basis of readjustment as to prices, wages and salaries. If so, it will be another instance of the shortness of human foresight, as many labored forecasts of the past as to the reduction in prices and wages because of much multiplication of machinery and our illimitable ore and coal deposits have, like many other theories, been discredited by a prosperity which has made a new record and developed new problems and opportunities—a prosperity in the unabated enjoyment of which 1907 opens.

Condition of Trade.

The familiar story of the record of 1906 is referred to in the various reviews of the market which are given on other pages and the starting point of 1907 is thus furnished, as the final work of the old year is to usher in its successor, which bears indeed a new designation but without any magical change in the condition of things. It has the advantage of being characterized by a large volume of current business and attended with most sanguine expectations of continued activity in trade. The situation is regarded with peculiar interest by careful students of the trend of things, and, notwithstanding

the hopeful tone which prevails, with something more than the uncertainty with which the future with all its possibilities is ordinarily regarded. It is recognized as possible that it may be that we have entered upon a new era of higher values, larger volume of business and more constant prosperity on the part of the country as a whole, so that the serious reaction which has marked every previous period of exceptional commercial activity and profitable business may be escaped and trade follow a more even course, as on a tableland with only moderate undulations instead of the abrupt elevations and declivities with which past history has made us only too familiar. Some, perhaps under the influence of too sanguine a spirit, hold to this comfortable theory, to the soundness or the error of which it is not unlikely that 1907 will bear witness. Most men of experience still hold to the view that the laws of trade, the tendency to go too fast and too far, the remorselessness of reaction, will again assert themselves and a period of overproduction, contraction, financial stress and lower prices sooner or later succeed present conditions. These questions and many phases of the fascinating problems which command the attention of business men are touched upon in the exceedingly valuable letters given in other columns expressive of the views of leading manufacturers and jobbers. In this way the judgment of many of the ablest men in the trade, not a few of whom occupy commanding positions, is laid before our readers. Apart from the determination of these great questions, which can indeed only be settled by time, each manufacturer and merchant finds himself confronted with the problems which immediately concern his own business, which with the activity which prevails present fewer difficulties and solitudes than usual. The year fortunately opens with a large volume of trade, a market in which it is, as a rule, easy to sell goods and with general wellbeing on the part of the people, insuring a great consumption of the commodities of life. Only slight signs of a lessening of the pace are here and there observable, and it is believed by many conservative men that a checking of the tendency toward higher values, even though connected with some temporary interruption of the demand, would probably contribute in the long run to the permanence of the existing prosperity.

Chicago.

Hardware jobbers, manufacturers and retailers were busily engaged during the holiday week in making their midyear inventories, and as practically all of their salesmen were off the road trade was quiet. The volume of business transacted by the retail merchants throughout this section in the holiday period surpassed all previous records, and the stocks that have been carried over are of small proportions as compared with those of previous years. This will undoubtedly encourage heavy purchases of these goods in the future, as many merchants have succeeded in increasing their December sales so that they rank with the most active months. The outlook for the ensuing year is exceedingly bright, and the indications point to a renewal of the activity which characterized the fall months as soon as the buying movement commences for the spring trade. During the past few weeks many manufacturers have made inroads on their accumulated orders and improved shipments are anticipated during the next two months. A large portion of the tonnage for the spring trade has already been placed with the Wire mills, whose December business was almost as heavy as that booked during October. Makers of Cut Nails are unable to cope with the demand and shipments into this territory are very light. This shortage promises to be accentuated as the demand grows and a large tonnage will undoubtedly be diverted to the Wire

Nail producers. The high cost of raw materials is indicative of a continued upward movement in the Hardware lines, as the prices of many classes of goods have not advanced in proportion to the increased cost of manufacture. Local distributors of the heavier lines, such as Iron and Steel Bars and Sheets, report that mill shipments are still deferred from two to three months and that little improvement can be looked for during the first half of the year. Stocks are low and badly broken and the continued heavy demand prevents their replenishment.

Nashville.

GRAY & DUDLEY HARDWARE COMPANY.—The year which has just closed has been one of most wonderful prosperity—it has certainly been a satisfactory year to the Hardware jobbers of the South. By this we do not mean that they have had no troubles. We do not suppose that they are making money so rapidly as to worry about whether or not it is a crime to die rich, nor do we suppose that they are particularly concerned about the passage by Congress of a law taxing great incomes. We haven't heard of any of the jobbers discharging their force in the claim or "grief" department and dispensing with this work altogether, nor have we heard of any of our jobbing friends writing their traveling men to increase their traveling expenses. In fact, they seem to be sufficiently large.

Speaking of our own company, will say that we haven't "fired" the head of our claim or "grief" department because he did not give rebates enough, nor have we dispensed with any of our traveling men on account of the smallness of their expense account, yet we are all happy, and we believe the South has enjoyed her full share of the good things which were dealt out by a kind Providence during the year 1906.

No previous year has witnessed such a great development of the resources of the Southern country, which as yet are considered in an undeveloped state. Every iron furnace is in full blast, every coal company that can get cars to ship the coal is running full time, a great many new phosphate mines have been opened up, and quite a number of large fertilizer plants have been started during the year. All of these industries are in a most prosperous condition, there being no complaint whatever aside from the car shortage.

There has been greater improvement in the methods of agriculture, and the farmers of the South are getting far better results than ever before. While it is true seasons have been favorable, the farmers have come to realize that "they must sow before they reap," and there is no question but what they have put forth a great deal more effort the last year or two than ever before. The results which they have obtained, of course, have encouraged them, and we look for still better results in the future. In fact, farming in the South is getting on a business basis.

Statistics show that manufacturing in the South has had a larger percentage of increase than in any other section of the country, and we do not know of a single well managed manufacturing enterprise of any kind in the whole Southern country that is not making money.

With the exception of damage to crops by excessive rain and storms we have had no serious interruption of business during 1906; on the other hand, we have had an advancing market and splendid demand for goods; in fact, almost an ideal situation for the Hardware dealers, both wholesale and retail, to get good returns from their efforts.

Collections have been pretty good through the year, and the business of 1906 closes in good shape, with magnificent prospects for 1907.

We wish *The Iron Age* and all of its readers a happy and prosperous New Year.

Philadelphia.

SUPPLER HARDWARE COMPANY.—In looking backward over the year just finished we are more than ever impressed with the value of foresight as compared with hindsight. The currently expressed opinion a year ago of many able writers that we had reached the top of the

hill, and that it would be all that could be expected of 1906 if the then current prices were maintained, shows that even the shrewdest guessers on the situation were at fault, and that history is still in the making. It is now generally conceded that no such uninterrupted spell of prosperity has ever happened to a nation at large, nor to our individual craft in particular. Examples of prosperity are too numerous to mention, and the mind tires of statistics, as, for instance, the statement made within the past few days, by the representative of a large steel interest, that he could book 1,000,000 tons of rails, if he could promise reasonably prompt delivery—this on top of the well-known fact that the entire production of the rail mills for 1907 has been contracted for.

There are no indications of any let-up in the demand for almost every line shown in the voluminous catalogues of the Hardware jobbers. No surface indications are visible, and the only reason for believing that a change will come is that seasons of prosperity have been in times past both preceded and followed by those of depression. It will undoubtedly be the part of wisdom to keep the ship in readiness for the possible storm, and not be deceived into the idea that fair weather is going to last forever. The probability is that when the break comes it will come like thunder out of a clear sky. We have builded our commercial edifices to such towering heights that greater dangers menace us than when we lived nearer the ground. The danger of earthquake and cyclone to any community is much increased by the modern skyscraper, and so, while we enjoy the sunlight and pure air of the 20 and 30 story office buildings, we cannot help but realize that if disaster came we would have very much less chance of getting to a cyclone cave or under a sheltering tree than did our ancestors whose work was done on the ground floor.

We have every reason to be grateful for the conditions which have surrounded us during the past year, and while business has been hampered and the ordinary vexations have been increased many fold, owing to the difficulty of obtaining needed supplies, we now, in looking back over it, recognize that these were but the thorns in the rose bush of prosperity, and that in the aggregate the bitter has been all but lost in the sweet.

As the opportunity presents itself, we are glad to wish *The Iron Age* and its many readers a very happy New Year.

Cleveland.

THE W. BINGHAM COMPANY.—Christmas, the merriest day of the year, has come and gone, and many hearts, young and old, have been made happy, and as we have been taught from infancy that "it is more blessed to give than to receive," the Yuletide is the best time in the year to distribute our gifts.

As we enter the new year and look back upon the long and strenuous hours we have given to our business in the year just passed (which to a thorough business man is always a great pleasure, not only for the "pelf" that he gathers, but for the enjoyment it always affords one to see that things have moved), the prosperity we have enjoyed, are enjoying now and are looking forward to we feel we have rightly earned, because we have not been prompted with a desire to speculate on the different lines of goods that we sell, but have striven to furnish them to our customers at a reasonable profit. We believe in the old maxim—viz., "It is the nimble shilling that makes us rich and happy"—and we have endeavored to keep our stocks turning and been satisfied with a moderate advance over the cost.

Our people are great consumers of all kinds of goods, because they have been educated to live in better houses, wear better clothes and eat purer and more nourishing foods than any other people on the face of the globe. Therefore it costs the American citizens more to live nowadays than it did in years that have passed. The melons that were cut by the large corporations throughout our land, in the way of dividends and paying interest, will line the pockets of our people with the wherewithal to buy what they want. It is reported that the banks of New York alone will distribute in the way of dividends and interest in January over \$200,000,000.

With the advent of the new year will come the annual inventory or stock taking, and our merchants and manufacturers will soon know on which side of their books their accounts are balanced. It would be well that we do not deceive ourselves when we strike this balance. Those of us who expect to continue doing business at the same old stand should not delude ourselves with the idea that if we inventory our stocks at the highest market prices we are making money for ourselves and are getting rich. We believe the correct way for the merchants and manufacturers who expect to remain in business would be when they take their inventory to price all goods that have advanced at what they actually cost, and all goods that have declined at the lowest price. If they do this when they strike their balance they will not fool themselves and their profits will show on the right side of the ledger.

The continued and increased demand for metals of all kinds, such as tin, copper, lead, spelter and pig iron, all of which enter so largely into the manufacture of general Hardware, indicates that a great many prices on manufactured goods must be readjusted from time to time to meet these advances. Also the readjustment of the wage scale that is constantly coming up in different branches of business is another question that must be considered. The immense quantities of manufactured goods that we export are another thing that is going to make quite a difference in the price of many goods. Why? Because if our surplus of manufactured goods go out of the country, will it not have a tendency to steady prices here at home?

Our transportation companies are offered more freight than they can take care of promptly. More freight cars, larger engines, heavier rails and stronger bridges are needed. All these matters must be looked after, and they will consume a large amount of money and manufactured goods to bring the transportation service up to the proper standard.

We sincerely believe that the year 1907, which we are just entering, will be one of the most successful and money making years in the history of all kinds of trade, and especially so in the Hardware business.

We desire at this time to express to our customers, our friends, in fact, to all of our fellow countrymen, our wish that they may have a happy and prosperous new year. We assure our customers and friends, one and all, that it will be our aim to contribute in every way possible to this result, and want to thank them for the good cheer and trade they have given us in the year that has just closed.

Louisville.

BELKNAP HARDWARE & MFG. COMPANY.—The year closes with everything to encourage the manufacturer and dealer as far as business is concerned. The main adverse conditions come from abnormally high rate for money, lawlessness in various shapes, crude forms of local taxation, which are generally determined on by illy informed people and bear very heavily upon established usages.

The discussion of the right kind of currency and how to get enough of it for people in Wall Street and for those who are left of the old greenback party out in this part of the country is a question which apparently gives the Secretary of the Treasury something to think about all the time. Whether we are to have fiat money on a small scale or asset currency on a large scale is where differences of opinion come in. The statisticians tell us that never before in the history of the country have we had such a large amount of money per capita, and yet when they put the screws on in Wall Street the rate bobs up to 30 per cent. or more. This is wholly unworthy of New York as a great financial center. It cannot take its rightful place alongside of London, Berlin and Paris if it permits such things to happen day by day.

The great crops—the natural sources of wealth—are apparently moving in fair volume. A large amount is still held back—tobacco and corn crowd the barns and line the depot platforms. The consumption of the world is huge, and its ability to pay is at present unquestioned, and along with these means of maintaining life and

health are the various special efforts for prolonging life by restraining its enemies within bounds. The fight against tuberculosis is an example in point; also regulation of child and woman labor. If we can prevent the more delicate tissues from being exhausted and worn out we shall have longer life and more happiness for more people.

Business at every period during the year has been extremely active, and the contracts for next year, running well into the second half, show that buyers believe in the future enough to provide for their wants most liberally, and these wants are, we take it, largely increased over any previous time. If we can keep our heads cool and practice self-control, which is necessary in these large social and industrial movements, we are destined to enjoy a most prosperous year in 1907, we believe, and that is what we wish to the management and all readers of *The Iron Age*.

Omaha.

LEE-GLASS-ANDRESEN HARDWARE COMPANY.—After having enjoyed a record breaking holiday trade business has settled down to the usual midwinter schedule. The record of 1906 shows the largest volume of business ever transacted, and the results indicate a healthy growth with commensurate financial benefits. It is expected that a season of comparative quiet in business circles will intervene between now and the opening of the spring campaign. This of course is customary. The general feeling, however, of business men throughout the trans-Missouri region is that all conditions point to a heavy volume of business, at least until the new crop begins to attract attention.

The activity in all lines of trade, and the immense crops that have yet to be moved Eastward, create a well grounded apprehension that the railroads with all their increased facilities will be more or less hampered in their efforts for the next few months in hauling the surplus of the crops to their destinations.

The condition of the entire Western country may be stated as one of healthfulness, progression and prosperity. Never in its history has it enjoyed such an independent financial position. A series of years of immense crops at remunerative prices has placed producers out of debt, leaving a handsome surplus for additional improvements and new enterprises, and this is the main reason why general business has flourished continuously, and in all probability will continue to increase.

New Orleans.

WOODWARD, WIGHT & Co.—New Orleans is at present dependent for its trade in the United States on the cotton industry, with its by-products of cottonseed meal, hulls, &c., on sugar, on rice and on lumber. Its Hardware trade outside of the United States is now going to Cuba, Central America and a small amount to South America.

Taking these up in detail, the cotton situation is the one that is the most generally known. With few exceptions our cotton planters have for the last several years been in very good shape, and there has been a steadily increasing demand for the better grade of Tools and Agricultural Machinery from them every year. The "agricultural" grades are in no wise in such great evidence as they were before, and it is only a little while when the cotton planter will be buying just as high grade Tools as the farmer in any part of the United States. This industry is in decidedly good shape, and it and lumber have done more to make the South rich in the last few years than anything else.

Our sugar crop has unfortunately been a light one. Except in a very few instances most of the planters are through grinding already, while in a normal year they do not finish until January and sometimes in February. This means a light crop and poor returns, but as we have had for the past two or three years good conditions in the sugar section it will simply mean that the plantation owners will go with very much reduced profits this year and will not mean putting on mortgages or any really heavy financial loss. There is with us also in the sugar industry the prospect of the free alcohol bill helping the sugar planters materially. In fact, there is a small alco-

hol industry here already, built up in the last four or five years, which has drawn its raw material entirely from the sugar planters of Louisiana and Cuba.

The rice situation is one that year by year is steadily improving. Rice is a food that will rank with the potato as a low priced diet and a nutritious one. We have been handicapped hitherto during the past 10 years when the rice industry has been growing by having to learn how to plant it, how to gather it and how to mill it to the best advantage, and also by having to introduce it as a food through the North. Gradually more and more of it is going to the North and West, being sold as an article of food instead of as a dessert, and at the same time the rice industry has learned how to handle itself and has got on a basis in the past two years where the rice farmer gets cash for his crop after raising it, instead of paying toll to the mill owners and not getting his returns until four or five months after the crop has been harvested. We have made this present crop, which is a large one, at good prices, and many of the banks in the rice section are loaning money here in New Orleans. There should be a steadily increasing demand from this territory for Hardware and Agricultural Machinery.

The lumber industry for the last five years has seen a steady increase of value in its stumpage, and lands that were sold five and six years ago for \$5 an acre are now bringing \$40 and \$50 per acre. Lumber and cotton are the two great staples in the New Orleans territory, overshadowing all others, and with the continued good prices that our cotton people and our sawmill people have got for the last four or five years, the entire character of the country has changed. Schoolhouses, churches and well built dwellings have gone up everywhere, and our country has changed materially from the country of 10 years ago.

There is a steadily increasing trade for export with Cuba and the West Indies. Most of the large Hardware houses now have this business well in hand and well organized, and while it is, of course, still in its commencement, it is the opinion of all interested in the trade here that the business with these countries is one that will steadily increase, due not only to our geographical situation, but also to the large Latin element we have in New Orleans, which perhaps makes us understand the ways of the Spanish-Americans better than they do further North.

There has been considerable business done here by all the Hardware houses and supply houses with the Isthmian Canal Commission. Our shipping facilities to the Isthmus have been materially increased, our time of transit shorter, and New Orleans has always had more or less close relations with Central America, probably due to the banana trade and the coffee trade with those countries.

Collections are coming in very slowly. There are some sections, such as north Louisiana and some parts of the Rice Belt, where the cotton and rice crops have already been turned into cash and in these sections collections are good, and the banks are loaning their funds out. But as a general thing the car service has handicapped almost all of the industries in this section and is keeping a tremendous amount of money tied up during transit. We feel this particularly now, but at the same time we look forward to a decrease in this stringency and to matters getting back into normal condition in this territory in the latter part of January or the first part of February, as they have done in former years.

The demand for all kinds of Hardware has during the past year been remarkably good, also for everything in the line of building material.

Our sewerage and drainage systems and our filtration plant will all be completed in the next year or year and a half, and with their completion will come a tremendous demand for Plumbers' Supplies, to be used in connecting up. New Orleans has been the most backward of all the large cities in these lines, but we are spending millions of dollars on them now and have been for the last two years. It is now only a few weeks before part of the work will be entirely finished, and by the end of 1908 we should have one of the finest drained cities of the country and the cleanest and best water.

Baltimore.

CARLIN & FULTON.—It was most fortunate for busy man that his inventive genius devised the calendar, and by its calling attention to the passing of days and months and years giving occasion and opportunity for a mental review of one's self and surroundings; otherwise the restless energy of our everyday life reaching out ever to the future would forget to look back and read the history of what has been done, and study the principles or causes or forces which have produced such results, and on which may be based the ambitions or plans for the months to come.

A year has now ended full of achievement in many ways. The nation has progressed and a new census would show a wonderful increase in its material development; bountiful harvests have blessed the farmers; the mines of gold and silver, of copper and lead, and iron and coal have yielded up their treasures; the smoke stack of every factory has given evidence of the busy life within; transportation facilities are not equal to the business offered; the demand for labor is in excess of the supply and it dictates its own terms, and every staple commodity shows an enhanced value as compared with the figures of former years.

The iron industries, which are conceded to be the barometer for all trade, indicate at least for this country an activity far beyond that ever known, with a production of iron and steel never dreamed of heretofore and which nevertheless cannot supply the demand. The wave of prosperity is now at flood tide; it is talked about on the rostrum and from the pulpit; it is written about in the magazine, the review and the press, and there can be no mistake as to its being a fact. The query now is opportune, "Will the tide begin to ebb and when?" Let us pause and reflect a while over present conditions.

The domestic consumption of this country is something enormous, stimulated largely by the great expenditures of the railroads in their betterments, and this is taxing to the uttermost the productive capacity of our mills and furnaces. Manufacturers and merchants, however, are looking forward to a time when there will be a necessity for new markets, and they recognize the fact that to keep up the present pace we cannot afford to be restricted by the boundaries of our own country.

Now, what are the conditions upon which we expect to do the commerce of the world, or at least to compete for it? We have already our raw materials so high that, in spite of the tariff, manufacturers are arranging for importations of foreign iron. Labor is not only higher here than in any other part of the world, but also the curtailment of the hours per diem has diminished the production per capita. The immense business being done all over the world has, while developing and creating wealth, also made a great demand for money, and this, added to our own peculiar system of national finance, has made the rate of interest higher here than in any other civilized country in the world.

So we have to consider in our efforts for the world's markets the fact that the present fundamental costs of production—viz., raw material, labor and capital—are all on a basis which will be to our disadvantage unless we make the domestic consumer pay more for his necessities than the one abroad, and arrange the selling prices to arrive at a satisfactory average. This we do not believe will ever be permitted to continue long if discovered. Should then the foreign markets be closed to our manufacturers and exporters will the domestic demand keep up with the supply? If not, what will be the result?

Overproduction means either shutting down factories and mills or reducing the costs of manufacturing to the level of competition. That this will happen eventually seems almost certain, but how soon who can tell? In the meantime we are all thankful for our mercies.

The volume of business for the year just ended has been universally great, and the future demand, with no speculative element in it, promises equally as well. Our stocks of merchandise are enhancing instead of, as in former years, depreciating in value. While the cost of living has increased, and in many instances without reason, it is hoped that illegal combinations to advance the

necessities of life will be restrained and punished and made impossible through governmental supervision. The exposure of wrongdoing by some men most prominent in the world of finance, business and politics has been a fearful indictment of business morality, but if a higher sense of honor is evolved and the demand of the people that crime must be punished, no matter by whom committed, be obeyed, then the results obtained will offset the cost.

The general condition of the individual consumer or citizen is better than ever before, giving him a sounder basis for credit, which thereby benefits and sustains the whole fabric of trade.

We trust that you and all your readers may realize in 1907 the good that we wish them.

Portland, Oregon.

FAILING, HAINES & McCALMAN.—Business conditions in this territory for the past year have been of the best, but the prospects are that for the year of 1907 they will be even better. The enormous immigration of investors and homeseekers has stimulated a demand for Hardware and all lines connected with building to such an extent that we have even a worse time in getting goods to supply the demand than the rest of the country.

In all lines of Mining, Milling and Manufacturing Supplies, general Hardware and House Trimmings, the orders have come in so fast that dealers are almost swamped. The increased output of lumber, the extension of mileage of railroads and the prospect of even greater increase, promise us even greater prosperity for the coming year. In all lines of Hardware which touch on the lumber trade the demand will increase continually for several years to come, as our forests are almost the sole source of the future lumber supply of the United States.

The car shortage has had a tendency to retard business, but the forces for prosperity have been so many and so material that in this trade, and, we understand, in all others, it has not been felt as much as it might have been. However, the railroads are making every effort to reduce the shortage and apparently have cars enough now, but are unable to move them. From the statements of the railroads themselves the average freight car in this section is making only one-tenth of the mileage per day that it should make. This, of course, is due to shortage of locomotives and terminal facilities. This is the only cloud on the business horizon of the new year in this territory. If this can only be done away with there is nothing apparently to hinder us from having the busiest and most prosperous year we have ever known.

St. Louis.

NORVELL-SHAPLEIGH HARDWARE COMPANY.—Nineteen hundred and seven, and a clean sheet of paper to write on. No blots, no mistakes, no errors, nothing but possibilities.

It is surely a great responsibility to live. There is an especial responsibility upon the shoulders of those who sit in high places.

How easy it is for us to moralize as we pause between the two years, the one that passes and the one that comes. It is up to every man to do his very best every day, in his own big or little life, the coming year.

Before me on my desk is a little card with a quotation from that great and good preacher, Phillips Brooks of Boston:

"O! do not pray for easy lives. Pray to be stronger men. Do not pray for tasks equal to your powers. Pray for powers equal to your tasks. The doing of your work shall be no miracle. But you shall be a miracle. Every day you shall wonder at yourself, at the richness of life which has come to you by the grace of God."

NOTES ON PRICES.

Wire Nails.—Demand continues unusually heavy for the season, while specifications on contracts are coming in freely. The amount of business booked by the mills for the month of December was ahead of the corresponding month of former years. Jobbers' stocks show broken assortments and mills are three or four weeks behind on

deliveries, while shortage of cars is interfering with shipments when Nails are available. Prices are firm. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers.....\$2.00
Carload lots, to retail merchants..... 2.05

New York.—There has been no definite interruption of the demand, and while not as brisk as during the early part of December and previously, business keeps up remarkably well for the season. Prices are being very well maintained. New York quotations are on the following basis: To retailers, carloads, on dock, \$2.19; less than carloads, on dock, \$2.33; small lots, at store, \$2.30.

Chicago.—December was another record month in the Wire trade, both as to new tonnage and specifications. The volume of business of the closing months of previous years, not only of Nails, but Wire products generally, was exceeded by a large margin, and the new year opens auspiciously for the trade. The car shortage is growing more acute daily and shipments are again being deferred. The demands of the jobbing trade for early deliveries are insistent and reflect depleted stocks. Efforts to accumulate goods for the spring trade have thus far been unsuccessful, as the mills have been unable to more than meet the current requirements. Prices are firmly maintained as follows: \$2.15 in car lots to jobbers and \$2.20 in car lots to retailers, with an advance of 5 cents for less than car lots from mills.

Pittsburgh.—Demand for Wire Nails continues very active, and the mills entered the new year with a heavy tonnage on their books and very much behind in deliveries. Specifications on contracts continue to come in freely, and prices are very firm. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads to jobbers\$2.00
Carload lots, to retail merchants..... 2.05

Cut Nails.—Conditions show no improvement in as far as they relate to the mills' ability to supply Nails. Stocks held by jobbers and mills are generally broken and light, and in some instances product has been sold up for two or three months ahead, resulting in a large number of unfilled orders. Quotations are as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, \$2.05; less than carloads, to jobbers, \$2.10; less than carloads, to retailers, \$2.20. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

Chicago.—Shipments from Eastern mills are daily being further deferred and local stocks are lower than ever before in the history of the trade. The outlook for the future is not bright, as few of the manufacturers are in position to make deliveries in less than three months, and the temporary closing of one plant has further curtailed the supply. Current requirements for this season are heavy, the demands of the railroads and car builders being abnormal. Quotations are unchanged, as follows: Iron Cut Nails, car lots, to jobbers, \$2.30; to retailers, \$2.35; Steel, to jobbers, in car lots, \$2.20; to retailers, \$2.25.

Pittsburgh.—Demand continues fairly active and stocks held by the mills, and also by jobbers, are very light and badly broken. The Cut Nail mills have more unfilled orders on their books than at any period in a long time and are considerably behind in deliveries. Some of the mills have their output sold up for the first two or three months of the new year. Quotations are as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, \$2.05; less than carloads, to jobbers, \$2.10; less than carloads, to retailers, \$2.20. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

New York.—Some deferred carload shipments of Cut Nails are understood to have been received in this city, which were contracted for at much lower than the prices ruling at present. The temporary stability of the local

market will depend to some extent upon whether those who have received the Nails care to hold them for spring demand. It will be seen that mills are much behind in shipments from the fact that these cheaper Nails are just being received. Jobbers' regular quotations are on the basis of \$2.30 for small lots at store.

Barb Wire.—During December an unusually large volume of business was placed with the mills for that month, with a view on the part of distributors to accumulate spring stocks. Requests for prompt shipments on the part of the mills are insistent. The market is regarded as firm. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots.....	\$2.15	\$2.45
Retailers, carload lots.....	2.20	2.50
Retailers, less than carload lots.....	2.30	2.60

Chicago.—During the month of December the leading jobbers placed contracts with the mills for practically all of their spring requirements, and much of the business that usually comes to the mills in January has already been closed. Efforts are being made by all the distributors to accumulate stocks and are therefore crowding the mills for shipments. We quote: To jobbers, Chicago, car lots, Painted, \$2.30; Galvanized, \$2.60; to retailers, car lots, Painted, \$2.35; Galvanized, \$2.65; retailers, less than car lots, Painted, \$2.45; Galvanized, \$2.75; Staples, bright, in car lots, \$2.25; Galvanized, \$2.55; car lots to retailers, 10 cents extra, with an additional 5 cents for less than car lots.

Pittsburgh.—The large jobbers continue to place heavy orders for spring trade, and tonnage entered by the mills for future delivery is heavy. The market is very firm, and, we are advised, official quotations are being rigidly held. All indications point to a very heavy spring trade. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots.....	\$2.15	\$2.45
Retailers, carload lots.....	2.20	2.50
Retailers, less than carload lots.....	2.30	2.60

Smooth Fence Wire.—Specifications on contract orders continue heavy, and are in excess of the output of the mills. Owing to the fact that large consumers placed orders for future requirements some time ago new business is comparatively light. Prices are firm. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....\$1.85
Retailers, carloads..... 1.90

The foregoing prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12	12½	13	14	15	16
Annealed.....Base.	\$0.05	.10	.15	.25	.35	.45	.55		
Galvanized....	\$0.30	.35	.40	.45	.55	.65	1.05	1.15	

Chicago.—Specifications received by the mills from manufacturers during the last 30 days were almost as heavy as during the earlier fall months and are indicative of a continued heavy consumption. Fence manufacturers are unanimous in reporting record sales, and without exception are still behind in shipments. The requirements of this trade have been enormous and are still heavy, despite the close of the season. Quotations are firmly held, as follows: In car lots, to jobbers, \$2, f.o.b. Chicago, and to retailers, \$2.05.

Pittsburgh.—Specifications on contracts continue to come in very freely, and in fact are heavier than the output of the mills. New tonnage is rather light, as the large consumers placed their orders for future delivery some time ago. Prices are firm, and some of the smaller mills are asking premiums for prompt delivery. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....\$1.85
Retailers, carloads..... 1.90

The foregoing prices are for base numbers, 6 to 9.

Bolts, Stove and Tire.—Continued strength is observed in prices on Stove and Tire Bolts as a result of

Baltimore.

CARLIN & FULTON.—It was most fortunate for busy man that his inventive genius devised the calendar, and by its calling attention to the passing of days and months and years giving occasion and opportunity for a mental review of one's self and surroundings; otherwise the restless energy of our everyday life reaching out ever to the future would forget to look back and read the history of what has been done, and study the principles or causes or forces which have produced such results, and on which may be based the ambitions or plans for the months to come.

A year has now ended full of achievement in many ways. The nation has progressed and a new census would show a wonderful increase in its material development; bountiful harvests have blessed the farmers; the mines of gold and silver, of copper and lead, and iron and coal have yielded up their treasures; the smoke stack of every factory has given evidence of the busy life within; transportation facilities are not equal to the business offered; the demand for labor is in excess of the supply and it dictates its own terms, and every staple commodity shows an enhanced value as compared with the figures of former years.

The iron industries, which are conceded to be the barometer for all trade, indicate at least for this country an activity far beyond that ever known, with a production of iron and steel never dreamed of heretofore and which nevertheless cannot supply the demand. The wave of prosperity is now at flood tide; it is talked about on the rostrum and from the pulpit; it is written about in the magazine, the review and the press, and there can be no mistake as to its being a fact. The query now is opportune, "Will the tide begin to ebb and when?" Let us pause and reflect a while over present conditions.

The domestic consumption of this country is something enormous, stimulated largely by the great expenditures of the railroads in their betterments, and this is taxing to the uttermost the productive capacity of our mills and furnaces. Manufacturers and merchants, however, are looking forward to a time when there will be a necessity for new markets, and they recognize the fact that to keep up the present pace we cannot afford to be restricted by the boundaries of our own country.

Now, what are the conditions upon which we expect to do the commerce of the world, or at least to compete for it? We have already our raw materials so high that, in spite of the tariff, manufacturers are arranging for importations of foreign iron. Labor is not only higher here than in any other part of the world, but also the curtailment of the hours per diem has diminished the production per capita. The immense business being done all over the world has, while developing and creating wealth, also made a great demand for money, and this, added to our own peculiar system of national finance, has made the rate of interest higher here than in any other civilized country in the world.

So we have to consider in our efforts for the world's markets the fact that the present fundamental costs of production—viz., raw material, labor and capital—are all on a basis which will be to our disadvantage unless we make the domestic consumer pay more for his necessities than the one abroad, and arrange the selling prices to arrive at a satisfactory average. This we do not believe will ever be permitted to continue long if discovered. Should then the foreign markets be closed to our manufacturers and exporters will the domestic demand keep up with the supply? If not, what will be the result?

Overproduction means either shutting down factories and mills or reducing the costs of manufacturing to the level of competition. That this will happen eventually seems almost certain, but how soon who can tell? In the meantime we are all thankful for our mercies.

The volume of business for the year just ended has been universally great, and the future demand, with no speculative element in it, promises equally as well. Our stocks of merchandise are enhancing instead of, as in former years, depreciating in value. While the cost of living has increased, and in many instances without reason, it is hoped that illegal combinations to advance the

necessities of life will be restrained and punished and made impossible through governmental supervision. The exposure of wrongdoing by some men most prominent in the world of finance, business and politics has been a fearful indictment of business morality, but if a higher sense of honor is evolved and the demand of the people that crime must be punished, no matter by whom committed, be obeyed, then the results obtained will offset the cost.

The general condition of the individual consumer or citizen is better than ever before, giving him a sounder basis for credit, which thereby benefits and sustains the whole fabric of trade.

We trust that you and all your readers may realize in 1907 the good that we wish them.

Portland, Oregon.

FAILING, HAINES & McCALMAN.—Business conditions in this territory for the past year have been of the best, but the prospects are that for the year of 1907 they will be even better. The enormous immigration of investors and homeseekers has stimulated a demand for Hardware and all lines connected with building to such an extent that we have even a worse time in getting goods to supply the demand than the rest of the country.

In all lines of Mining, Milling and Manufacturing Supplies, general Hardware and House Trimmings, the orders have come in so fast that dealers are almost swamped. The increased output of lumber, the extension of mileage of railroads and the prospect of even greater increase, promise us even greater prosperity for the coming year. In all lines of Hardware which touch on the lumber trade the demand will increase continually for several years to come, as our forests are almost the sole source of the future lumber supply of the United States.

The car shortage has had a tendency to retard business, but the forces for prosperity have been so many and so material that in this trade, and, we understand, in all others, it has not been felt as much as it might have been. However, the railroads are making every effort to reduce the shortage and apparently have cars enough now, but are unable to move them. From the statements of the railroads themselves the average freight car in this section is making only one-tenth of the mileage per day that it should make. This, of course, is due to shortage of locomotives and terminal facilities. This is the only cloud on the business horizon of the new year in this territory. If this can only be done away with there is nothing apparently to hinder us from having the busiest and most prosperous year we have ever known.

St. Louis.

NORVELL-SHAIPLEIGH HARDWARE COMPANY.—Nineteen hundred and seven, and a clean sheet of paper to write on. No blots, no mistakes, no errors, nothing but possibilities.

It is surely a great responsibility to live. There is an especial responsibility upon the shoulders of those who sit in high places.

How easy it is for us to moralize as we pause between the two years, the one that passes and the one that comes. It is up to every man to do his very best every day, in his own big or little life, the coming year.

Before me on my desk is a little card with a quotation from that great and good preacher, Phillips Brooks of Boston:

"O! do not pray for easy lives. Pray to be stronger men. Do not pray for tasks equal to your powers. Pray for powers equal to your tasks. The doing of your work shall be no miracle. But you shall be a miracle. Every day you shall wonder at yourself, at the richness of life which has come to you by the grace of God."

NOTES ON PRICES.

Wire Nails.—Demand continues unusually heavy for the season, while specifications on contracts are coming in freely. The amount of business booked by the mills for the month of December was ahead of the corresponding month of former years. Jobbers' stocks show broken assortments and mills are three or four weeks behind on

deliveries, while shortage of cars is interfering with shipments when Nails are available. Prices are firm. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers.....	\$2.00
Carload lots, to retail merchants.....	2.05

New York.—There has been no definite interruption of the demand, and while not as brisk as during the early part of December and previously, business keeps up remarkably well for the season. Prices are being very well maintained. New York quotations are on the following basis: To retailers, carloads, on dock, \$2.19; less than carloads, on dock, \$2.33; small lots, at store, \$2.30.

Chicago.—December was another record month in the Wire trade, both as to new tonnage and specifications. The volume of business of the closing months of previous years, not only of Nails, but Wire products generally, was exceeded by a large margin, and the new year opens auspiciously for the trade. The car shortage is growing more acute daily and shipments are again being deferred. The demands of the jobbing trade for early deliveries are insistent and reflect depleted stocks. Efforts to accumulate goods for the spring trade have thus far been unsuccessful, as the mills have been unable to more than meet the current requirements. Prices are firmly maintained as follows: \$2.15 in car lots to jobbers and \$2.20 in car lots to retailers, with an advance of 5 cents for less than car lots from mills.

Pittsburgh.—Demand for Wire Nails continues very active, and the mills entered the new year with a heavy tonnage on their books and very much behind in deliveries. Specifications on contracts continue to come in freely, and prices are very firm. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads to jobbers	\$2.00
Carload lots, to retail merchants.....	2.05

Cut Nails.—Conditions show no improvement in as far as they relate to the mills' ability to supply Nails. Stocks held by jobbers and mills are generally broken and light, and in some instances product has been sold up for two or three months ahead, resulting in a large number of unfilled orders. Quotations are as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, \$2.05; less than carloads, to jobbers, \$2.10; less than carloads, to retailers, \$2.20. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

Chicago.—Shipments from Eastern mills are daily being further deferred and local stocks are lower than ever before in the history of the trade. The outlook for the future is not bright, as few of the manufacturers are in position to make deliveries in less than three months, and the temporary closing of one plant has further curtailed the supply. Current requirements for this season are heavy, the demands of the railroads and car builders being abnormal. Quotations are unchanged, as follows: Iron Cut Nails, car lots, to jobbers, \$2.30; to retailers, \$2.35; Steel, to jobbers, in car lots, \$2.20; to retailers, \$2.25.

Pittsburgh.—Demand continues fairly active and stocks held by the mills, and also by jobbers, are very light and badly broken. The Cut Nail mills have more unfilled orders on their books than at any period in a long time and are considerably behind in deliveries. Some of the mills have their output sold up for the first two or three months of the new year. Quotations are as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, \$2.05; less than carloads, to jobbers, \$2.10; less than carloads, to retailers, \$2.20. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

New York.—Some deferred carload shipments of Cut Nails are understood to have been received in this city, which were contracted for at much lower than the prices ruling at present. The temporary stability of the local

market will depend to some extent upon whether those who have received the Nails care to hold them for spring demand. It will be seen that mills are much behind in shipments from the fact that these cheaper Nails are just being received. Jobbers' regular quotations are on the basis of \$2.30 for small lots at store.

Barb Wire.—During December an unusually large volume of business was placed with the mills for that month, with a view on the part of distributors to accumulate spring stocks. Requests for prompt shipments on the part of the mills are insistent. The market is regarded as firm. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots.....	\$2.15	\$2.45
Retailers, carload lots.....	2.20	2.50
Retailers, less than carload lots.....	2.30	2.60

Chicago.—During the month of December the leading jobbers placed contracts with the mills for practically all of their spring requirements, and much of the business that usually comes to the mills in January has already been closed. Efforts are being made by all the distributors to accumulate stocks and are therefore crowding the mills for shipments. We quote: To jobbers, Chicago, car lots, Painted, \$2.30; Galvanized, \$2.60; to retailers, car lots, Painted, \$2.35; Galvanized, \$2.65; retailers, less than car lots, Painted, \$2.45; Galvanized, \$2.75; Staples, bright, in car lots, \$2.25; Galvanized, \$2.55; car lots to retailers, 10 cents extra, with an additional 5 cents for less than car lots.

Pittsburgh.—The large jobbers continue to place heavy orders for spring trade, and tonnage entered by the mills for future delivery is heavy. The market is very firm, and, we are advised, official quotations are being rigidly held. All indications point to a very heavy spring trade. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots.....	\$2.15	\$2.45
Retailers, carload lots.....	2.20	2.50
Retailers, less than carload lots.....	2.30	2.60

Smooth Fence Wire.—Specifications on contract orders continue heavy, and are in excess of the output of the mills. Owing to the fact that large consumers placed orders for future requirements some time ago new business is comparatively light. Prices are firm. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.85
Retailers, carloads.....	1.90

The foregoing prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12	13	14	15	16
Annealed.....Base.	\$0.05	.10	.15	.25	.35	.45	.55	
Galvanized....	\$0.30	.35	.40	.45	.55	.65	1.05	1.15

Chicago.—Specifications received by the mills from manufacturers during the last 30 days were almost as heavy as during the earlier fall months and are indicative of a continued heavy consumption. Fence manufacturers are unanimous in reporting record sales, and without exception are still behind in shipments. The requirements of this trade have been enormous and are still heavy, despite the close of the season. Quotations are firmly held, as follows: In car lots, to jobbers, \$2, f.o.b. Chicago, and to retailers, \$2.05.

Pittsburgh.—Specifications on contracts continue to come in very freely, and in fact are heavier than the output of the mills. New tonnage is rather light, as the large consumers placed their orders for future delivery some time ago. Prices are firm, and some of the smaller mills are asking premiums for prompt delivery. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.85
Retailers, carloads.....	1.90

The foregoing prices are for base numbers, 6 to 9.

Bolts, Stove and Tire.—Continued strength is observed in prices on Stove and Tire Bolts as a result of

heavy demand and increased difficulty in filling orders. Manufacturers' quotations are now reported to be for immediate acceptance only and contract orders are being uniformly refused. Stove Bolts may now be quoted in a general way at 85 per cent. discount and Tire Bolts at 80 per cent.

Horseshoes.—Some attention is being directed by well posted merchants to the market for Horseshoes, a line which, although exceedingly close to the raw material, has not as yet shown the effects of the advancing markets of the past year. Especial interest is felt in the meeting of manufacturers to be held early this month, as it is thought not unlikely that a change, if contemplated, would naturally be made at this time. The price of Horseshoes has remained practically unchanged for an unusually long period.

Wire Cloth.—The trade is manifesting a lively interest in the market for Wire Cloth, which has developed great firmness. Indeed, jobbers are having difficulty in purchasing sufficient stocks to supply their requirements on the basis announced by the manufacturers to hold good until February 1. Some jobbers have paid considerable premiums for deliveries of Cloth, and it may be asserted that others would willingly do so if they could place their orders. As a matter of fact, several of the manufacturers seem to have booked all their possible output before the date specified, and are uniformly refusing to accept further orders. One explanation given for this state of affairs is that production is being limited by difficulty experienced by the manufacturers in procuring Wire for their machines, a large proportion of which must come from the same source of supply.

Pipe Cutters.—The upward tendency of prices on all classes of Tools, especially heavy lines which are most affected by advances in raw material, has been reflected in Pipe Cutters. A concerted advance of something over 10 per cent. on Barnes and Saunders pattern Pipe Cutters was made last week by several leading manufacturers.

Bridgeport Hardware Mfg. Company.—The Bridgeport Hardware Mfg. Company, Bridgeport, Conn., has sent to the trade a revised discount sheet, making some slight advances on some of its goods, the new prices going into effect at once. The advances have been occasioned by the increased cost of material and labor, and only such advances have been made as became necessary to make a reasonable manufacturer's profit.

The Goodwin & Kintz Company.—The Goodwin & Kintz Company, Winsted, Conn., finds it necessary because of the advance in the cost of all of the materials entering into the manufacture of its goods to advance prices on clocks, Metal Fancy Goods, Gas and Electric Portables, Electroliers, Mirror Plateaux, &c. These prices will be as moderate as consistent with the advanced costs of metals. Old prices are all withdrawn and new prices will be quoted on application.

Prepared Glue.—One or more manufacturers of Prepared Glue have adopted new price lists to go into effect January 1. Discounts to the retail trade remain unchanged.

Davis Mfg. Company.—Davis Mfg. Company, Milwaukee, Wis., has issued revised prices on its line of Bow and Bar Micrometers. The company states that it has increased its output to such an extent that it is in a position to supply the trade at reduced costs. Attention is also called to the fact that the company is especially well equipped to furnish Micrometers of the larger sizes as the tubular construction employed reduces the weight of these sizes materially and thus enables the operator to get the proper touch.

Cabinet Locks.—Leading manufacturers of Cabinet Locks have made a concerted advance in several lines of goods which sell at net prices. On listed goods the old discount of 33 1-3 per cent., with concessions on quantity orders, still remains in force.

Sash Cord.—Especial strength is observed in the market for Sash Cord, the advanced prices recently announced by leading manufacturers being very firmly maintained. When first adopted these prices were shaded

to a considerable extent by jobbers, but a scarcity of Cord seems to have developed and as a result quotations have been generally toned up. Different manufacturers report that they are offered all the business they can handle without solicitation.

Wrenches.—An advance has just been announced by leading manufacturers of Agricultural and Knife Handle Wrenches amounting to about 10 per cent. on the former and 5 per cent. on the latter line. On the new basis the market to the retail trade may be fairly represented by a discount on Agricultural Wrenches of 75 to 75 and 10 per cent., and on Knife Handle Wrenches, 50 to 50 and 10 per cent.

Tacks.—The noteworthy strength of the Tack market, to which attention has been called in several recent issues of *The Iron Age*, continues unabated. A steady toning up of quotations is observed on the part of important manufacturers, and as a result advances are also being put into effect by the jobbing trade. It is reported that manufacturers' quotations are for immediate acceptance only and have now advanced to 90 and 30 per cent. base discount, though it is understood that a base of 90 and 35 is still obtainable.

Steel Shelf Brackets.—Manufacturers of Wrought Steel Shelf Brackets have recently made a slight revision in their list prices on Japanned and Plated goods. The change which affects 3 x 4 in. and 4 x 5 in. Brackets represents a moderate advance on these two sizes. Other sizes remain as heretofore. There is no change in the discount on these goods, the market to retail trade being represented by a discount of 80 to 80 and 5 per cent.

Rope.—Manufacturers of Soft and Hard Fiber Cordage have found a ready market for about all their product during the past year at remunerative prices. Demand has kept up exceptionally well, and there has been an absence of that state of lethargy into which the trade is apt to fall toward the close of the year. Requirements have been somewhat less for December than they were for the preceding month, while those were less than for October. In fact, trade has gradually shelved off during the past three months. Most of the orders are for present shipment, but some contracts have been placed. The advances in the market have resulted in the trade covering its immediate requirements as necessity demanded, in a somewhat hand to mouth fashion. Manufacturers of Jute Cordage are largely devoting their energies to the production of Twines, &c., rather than Rope, and Sisal Rope is more economical than that made of Jute and more easily obtained. The market is fairly firm at the following prices, particularly for the better grades, with no prospects of immediate decline. New York quotations are as follows: Pure Manila, 12½ to 13 cents; B quality, 11½ to 12 cents; Pure Sisal, 9¼ cents; No. 2 quality, 7¾ to 8 cents; No. 1 Jute, ¼ in. and up, 9 cents; No. 2 Jute, 8½ cents per pound.

Window Glass.—The market has been quiet throughout the country during holiday week. The purchase of the large quantity of Glass by the jobbers' associations has had a steadying effect on the market, coupled with the recent advance made by the manufacturers. Meetings of the two jobbers' associations are scheduled for early in January, at which time it is expected that an advance in prices will be made. Jobbers' quotations, from jobbers' list October 1, 1903, are as follows: Greater New York, 90 and 10 per cent. discount for all sizes, single and double strength; outside of Greater New York, 90 and 5 for single and 90 and 10 per cent. discount for double strength Glass.

Paints and Colors.—Manufacturers of White Lead, dry or in oil, in kegs, have announced an advance in price of ¼ cent per pound. This is not within nearly ½ cent of the advance which has taken place in Pig Lead. The advanced prices are as follows: In lots of 500 lb. and over, 7½ cents per pound; in lots of less than 500 lb., 8 cents per pound net; Red Lead and Litharge, in barrels, half barrels and kegs, 7¼ cents. The regular advances for White Lead in pails and cans are charged. A general advance in the price of all grades of Mixed Paints will probably be made in the immediate future by at least 90 per cent. of the producers of these goods in the United

States. It is expected that the advance will be at least 5 cents per gallon. The increased cost of manufacture, as well as that of Turpentine, Dry Lead and Dry Zinc, is given as the necessity for making the advance. Tin cans have advanced 25 per cent. during the past year, as have also the wooden cases in which the cans are packed.

Linseed Oil.—The market is very quiet, and only a limited business is being done in jobbing lots. It is reported that at least one crusher has offered Out of Town Raw, for delivery during the next six months, at 39 cents per gallon. It has been nearly a month since the active demand for contract Oil ceased, and the announcement of the lower price created little interest among buyers. New York quotations for jobbing lots are as follows, according to quantity: City Raw, 42 to 43 cents per gallon; Out of Town Raw, 41 to 42 cents per gallon. Boiled Oil is 1 cent per gallon over Raw.

Hatchets.—An advance in Hatchets, taking effect the first of the year, has been made by the associated manufacturers, who have announced a base discount of 40 and 7½ per cent. The usual concessions from this price may be obtained by jobbers and other large buyers.

Clocks.—The upward tendency of brass products and fancy metal articles generally, due to the increased cost of labor and raw material has been reflected in an advance in many lines of Clocks, including Alarm Clocks. The movement seems to have been participated in by nearly all of the manufacturers.

Muzzles.—Manufacturers of Horse, Dog and Ox Muzzles, &c., are making quotations which represent slight advances on previous prices.

Spool Wire.—Strength is observed in the market for Spool Wire, although quotations of various manufacturers do not show entire uniformity. Prices, however, seem to tend upward, and some makers have announced quotable advances going into effect the first of the year.

Shovels.—Notices have been sent out to the trade by the constituent companies of the Ames Shovel & Tool Company announcing withdrawal of all prices on Shovels. It is expected that advances will be announced within a few days.

Lanterns.—Quotations on Tubular and Dash Lanterns, &c., show noteworthy firmness. While the prices of the associated manufacturers have not positively advanced it is reported that some outside makers are sold up well into the future and the demand is exceptionally heavy in all quarters.

Dinner Pails.—Somewhat higher prices are quoted on regular listed oblong Dinner Pails, slip cup and screw cup patterns.

Adzes.—Leading manufacturers of Adzes have made a concerted advance in prices, becoming effective January 1. The changes range from \$1 to \$2 per dozen.

Chas. F. Baker & Co.—Chas. F. Baker & Co., Boston, makers of a line of Wire Clinching Nails which are widely handled by the Hardware trade, have made an advance of 1 cent per lb. in their list prices. Discounts remain unchanged.

HARDWARE SALESMEN'S DINNER.

THE wholesale Hardware salesmen employed in the metropolitan district of Greater New York propose to hold a dinner Saturday evening, February 9, at the Hardware Club. The object of the affair is to promote good fellowship and an invitation to participate is extended to the trade at large. Tickets may be obtained from the members of the committee in charge of arrangements, of which Benjamin S. Alder, 37 Warren street, is chairman. Applications should be made not later than January 25.

THE BENJAMIN S. ALDER COMPANY, 37 Warren street, New York, is announcing to the trade under date of January 1 that it has been appointed representative of the Grey Iron Casting Company for New York City and export territory. The Company continues to represent Wrightsville Hardware Company, which includes Logan & Strobbridge Iron Company's line, all three concerns being under the control of the National Novelty Corporation. A handsome and complete sample line of the goods produced by these manufacturers, including a

full assortment of Cast Iron Hardware, House Furnishing Goods and Coffee Mills, has been installed at the Warren street address, and a revised catalogue will be issued at an early date. In the meantime, Benjamin S. Alder Company is prepared to quote prices and give full information regarding the lines of these companies.

The Siege of Battleburg.

BY WESTMOUNT.

FOR many years the peaceful little town of Battleburg had lain in its pretty valley among the mountains, overlooked apparently by the Scouts of The Catalogue House Army. Its inhabitants were happy and contented and the goods they bought from the old veteran General Merchant filled their every want.

The General had worked up a good business and won the esteem of the people, but he scented trouble from afar and knew that sooner or later the enemy would appear and bombard the town with tons upon tons of large paper shells called catalogues, the ammunition used by the Catalogue House Army in its new "Hot Air Battery," a recent invention of one of its clever and efficient officers.

He, therefore, like a good General, worked out his plan of campaign, posted his sentries and sat down to await the coming of the enemy.

The Enemy Came,

and came with a rush that nearly put the General out of business, old campaigner that he was.

He soon recovered himself, however, and got down to business. He secured one of their shells, or catalogues, looked it over long and carefully, then sent for one of his aids, Captain Dimes, a young but efficient officer.

The interview lasted some time before the Captain emerged and proceeded at once to his quarters at the Battleburg Bulletin, the flourishing daily paper of the town.

That evening the columns of the Bulletin contained an appeal from General Merchant to the citizens to rally around him and offering them as good terms as the enemy.

The Population Laughed;

they were being treated very well, they thought, by the enemy. He was making them fine promises and showing them pictures of the beautiful articles he was going to sell them for half the price the General would charge, and they thought they couldn't do better than stick to him.

The old General didn't despair, but kept right on with his campaign. Every night he attacked the enemy through the columns of the Bulletin. He showed up all his schemes, invited the public to call at his (the General's) store and see the kind of goods the catalogue houses would send them, and ended up by offering to duplicate any article shown in the catalogue at the same price, plus expressage or freight.

Thus the fight went on with the advantage on the side of the Catalogue Houses, until the unfaithful ones who had been the first deserters began to receive their shipments.

Then Came the General's Opportunity.

He explained how the great Catalogue Houses, by illustrations, clever descriptions and low prices induced the country people to send away their hard earned money for goods they hadn't even seen. He explained how these concerns had such an enormous line of customers all over the country that a few dissatisfied ones here and there made no material difference. If the goods were not satisfactory, who was going to lose sleep over it? Surely not the manager of the Catalogue House. It was the money they were after, and as they got that before the customer saw the goods the deal, so far as they were concerned, was closed.

He showed them by actual comparison that the goods they received from the Catalogue Houses were inferior to what he had been selling them all along, but told them if that was the quality of goods they wanted he would cheerfully supply them at Catalogue House terms.

It Was a Long, Hard Fight,

and the General went to bed tired every night, but he stuck to it, and soon his heart was gladdened by the sight

of the deserters coming back, gradually at first, then faster and faster, till he not only got all his old customers back, but many new ones besides.

Although the Catalogue House Armies kept up the bombardment at intervals, they were never again able to obtain a footing in the town.

The old General, by hard work and good judgment, had beaten them for fair. May he enjoy the results of his victory in peace.

THE NAIL AND WIRE MARKET IN 1906.

THE course of prices on Nails, Barb Wire and Smooth Fence Wire during the past year has been marked by regularity, with a decided strengthening in tone during the last quarter. Opening on a basis of \$1.80, f.o.b. Pittsburgh, for Wire Nails, quotations advanced \$1 per ton in January and remained firm under heavy demand until the beginning of summer, when slight concessions began to be made, and continued more or less general. Exceptional business during the summer, with a growing scarcity of steel and the natural curtailment of production incident to the heated season, prevented the accumulation of stocks at the mills, and about the middle of September all concessions were withdrawn. Two subsequent advances in all Wire products occurred in quick succession, amounting to \$1 and \$2 per ton, respectively, Wire Nails being quoted at \$2, f.o.b. Pittsburgh, during the closing weeks of the year, with mill and jobbers' stocks at a low ebb and car shortage greatly interfering with deliveries urgently needed by the trade. Cut Nails have followed a unique course. Starting 5 cents per keg lower than Wire Nails they have advanced during the latter half of the year under the influence of curtailed production and increased consumption until they are now 5 cents higher, with mills practically bare of stocks and running considerably behind their orders.

The following table gives the opening base prices (f.o.b. Pittsburgh, for car lots to jobbers) on Wire and Nails for 1906, together with the subsequent changes and the dates when they went into effect:

	Wire nails.	Cut nails.	Painted barb wire.	Smooth fence wire.
January 4.....	\$1.80	\$1.75	\$1.95	\$1.65
January 8.....	1.85	1.75	2.00	1.70
January 31.....	1.85	1.80	2.00	1.70
September 27.....	1.85	1.90	2.00	1.70
November 10.....	1.90	1.95	2.05	1.75
December 4.....	2.00	2.05	2.15	1.85

THE CHICAGO HARDWARE MARKET IN 1906.

Unparalleled activity characterized the Hardware trade of the West and Northwest throughout the year which has just come to a close, the increase in the volume of business as compared to 1905 being greater than ever before recorded in a like period. The abnormal conditions upset many established trade precedents, as the buying periods of many lines were extended into seasons which in previous years proved unfavorable for their sale. Production continually lagged behind consuming requirements, and jobbers' and manufacturers' stocks were never replenished to the point of completeness. Retail merchants, after repeated experiences with deferred deliveries, learned to cover more freely for future needs, and the indications are that this feature will become a custom of the trade, but in a more limited way when the pressure on the producers is relaxed. The cost of transacting business was also greatly increased, and the probabilities are that the per cent. of net profit will show a decline. The steady upward movement of raw materials, which reached its high at the close of the year, was reflected in the Hardware trade by repeated advances, but the increment in the selling cost at no time equaled that of the raw product, thereby greatly reducing the profits of the manufacturer. Inadequate transportation facilities further added to the difficulties of transacting business, and the delays occasioned by the shortage of cars and the slow movement of freight in transit contributed largely in not only curtailing production, but maintaining stocks at a low ebb.

Rapid strides were made in the further development of this territory as a producing center, and additional iron and steel making capacity has already proved attractive for the launching of projects for the manufacture of the more highly finished lines. To meet the competition of Western producers of Hardware Eastern manufacturers, not so favorably located, are being compelled to absorb a large portion of the haul to this great distributing point, and, to overcome this handicap, with the added inducement of an increased raw material supply, the movement for the establishment of branch manufacturing plants inaugurated several years ago gives promise of revival with renewed vigor. Larger and more diversified stocks of Eastern concerns are carried in this city than in any other center in the country, shipments invariably being handled in car lots to reduce the cost of transportation. Chicago, therefore, takes front rank as a distributing point for those manufacturers seeking the trade of the rapidly growing West and Northwest.

Noteworthy progress was made by jobbers in Duluth, Minneapolis, St. Paul and St. Louis, the growth of their trade probably showing a greater proportionate increase than recorded elsewhere, and added warehousing facilities which involved heavy expenditures have already proved inadequate for the growing demands of the trade. The limitations of Chicago's jobbing center on Lake street and the immediate vicinity in regard to transportation facilities and opportunity for expansion resulted in the removal of Kelley, Maus & Co. to a West Side location, where modern warehouses were built and a large wood-stock yard was established. Others, whose quarters are uncomfortably crowded, are likewise seeking sites elsewhere, and with these defections the street is in danger of losing its traditional significance.

Throughout the year price changes were so numerous and affected so many lines that announcements of advances were received by the trade with little or no surprise, and had the effect of stimulating buying rather than retarding it. The sensational upward movement of metals which set in more than a year ago continued without halt, and all finished lines dependent upon these materials were frequently advanced in sympathy. The scarcity of Sheets, both Black and Galvanized, added to the difficulties of manufacturing operations, and the advances recorded amounted to \$6 a ton.

All previous records in the building trades were broken, the cost of operations in Chicago having reached a total of \$65,432,680, as against \$63,463,400, the best previous record, established in 1892. Other Western communities likewise experienced building booms, and this activity was reflected in the trade by the heavy demand for Builders' Hardware which prevailed throughout the building season.

During the last five months of the year the Wire mills were unable to satisfy the needs of the trade, and bookings of new tonnages were made in October and November that were without precedent in the history of the trade. To satisfy the requirements of the greatest number mill shipments were prorated, and as a result of this wise policy there were no large stock accumulations at any point. The output of Barb Wire showed a big increase as compared to previous years, notwithstanding the extensive use of Field Fencing, but heavy purchases for railroad extensions were abnormal and figured largely in the total.

Prices were maintained at a normal level and were only advanced during the fall months when the congestion at the mills and the increased cost of raw material made it imperative. The spread between Wire products and Rods continually declined until they were almost on an equal basis in December. Naturally the independent Wire manufacturers had previously covered on a much lower basis, but those who were unable to secure their material and were compelled to invade the open market to meet their immediate needs could operate only at a loss.

Chicago Wire Nail Prices, 1906.

The course of prices of carload lots at Chicago during 1906, and for several years preceding, is shown in the

following table, the monthly prices being averaged from the weekly quotations contained in our market reports:

Month.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.
January	1.94	1.90	2.04	2.08	2.16	2.35	3.53	1.59
February	1.95	1.95	2.05	2.12½	2.20	2.45	3.53	1.73
March	1.95	1.95	2.09	2.20	2.20	2.45	3.53	2.09
April	1.95	1.95	2.10	2.15	2.20	2.45	3.28	2.25
May	1.95	1.95	2.10	2.15	2.20	2.45	2.53	2.35
June	1.95	1.95	2.07	2.15	2.20	2.45	2.43	2.60
July	1.95	1.95	2.05	2.15	2.20	2.45	2.43	2.70
August	1.95	1.87	1.90	2.15	2.20	2.45	2.43	2.80
September	1.96	1.87½	1.75	2.15	2.15	2.45	2.45	3.10
October	2.00	1.95	1.75	2.15	2.05	2.42½	2.35	3.20
November	2.04	1.95	1.77	2.15	2.00	2.35	2.35	3.28
December	2.15	1.95	1.78	2.00	2.00	2.35	2.35	3.53
Aver. for year.	1.98	1.93½	1.97	2.13	2.14½	2.41	2.76	2.60

Chicago Cut Nail Prices, 1906.

The following are the Chicago prices for Cut Nails, car lots, during the year:

January	\$1.89	July	\$1.90
February	1.90	August	1.90
March	1.90	September	1.90
April	1.90	October	2.05
May	1.90	November	2.10
June	1.90	December	2.25
Average for 1906, \$1.96; 1905, \$1.84; 1904, \$1.84½; 1903, \$2.33; 1902, \$2.25; 1901, \$2.34; 1900, \$2.48.			

Chicago Barb Wire Prices, 1906.

The course of prices of Galvanized Barb Wire in carload lots, Chicago, and for several years preceding, averaged from weekly quotations, are as follows:

Month.	1906.	1905.	1904.	1903.	1902.	1901.	1900.	1899.
January	2.39	2.35	2.64	2.68	3.01	2.95	4.13	2.05
February	2.40	2.40	2.65	2.75	3.10	3.05	4.13	2.25
March	2.40	2.40	2.69	2.80	3.10	3.05	4.13	2.62½
April	2.40	2.40	2.70	2.77	3.10	3.05	3.88	2.80
May	2.40	2.40	2.70	2.75	3.10	3.05	3.13	2.95
June	2.40	2.40	2.68	2.75	3.10	3.05	3.13	3.20
July	2.40	2.40	2.65	2.75	3.06	3.05	3.10	3.30
August	2.40	2.32	2.42½	2.75	3.00	3.05	3.10	3.40
September	2.41	2.32½	2.20	2.75	3.00	3.05	3.00	3.67½
October	2.45	2.40	2.20	2.75	2.68	3.05	3.00	3.77½
November	2.49	2.40	2.22½	2.75	2.60	3.05	3.00	3.88
December	2.60	2.40	2.33	2.60	2.60	3.00	3.00	4.13
Aver. for year.	2.43	2.38½	2.51	2.93	2.93	3.04	3.39	3.17

THE STAR ENAMELING & STAMPING COMPANY, Pittsburgh, Pa., is making important additions to its line of Sheet Metal Ware, consisting of Pieced, Stamped and Japanned Tinware, specialties in Galvanized Ware, Gray Mottled and Blue and White Enameled Ware. The recent additions to the company's plant, which consist of muffle and annealing furnace, heavy drawing presses and dies for all sizes of Berlin Kettles, Dish Pans, Chambers, Rice Bollers, Seamless Stock Pots, Strainers, Seamless Cups and Mugs, Cups and Saucers, Ladies, &c., will double the capacity of the factory, which is operating night and day. During 1907 the company will be represented by the following salesmen: J. A. Dorshimer, Pittsburgh; J. S. Andrews, western Pennsylvania, eastern Ohio and West Virginia; A. Schlesinger, Ohio, Indiana and Michigan; A. Watts, Chicago, Illinois and Wisconsin; C. P. Fitch, Minnesota, Iowa, Nebraska, Kansas and Missouri; Chas. Golding, Louisiana, Texas and Oklahoma; J. P. Dornruple, Tennessee, Alabama, Georgia and South Carolina; W. L. Stansbury, Maryland, Virginia and North Carolina; W. H. Dobson, central and eastern Pennsylvania; S. Stengel, New York State and Connecticut; H. O. Stansbury, Philadelphia, New Jersey and New York City; F. A. McCann, Massachusetts, Rhode Island, New Hampshire and Maine; J. A. Wallace, Pacific Coast. G. M. Fitch is special salesman and sales manager of the company.

ONE of his victims has called our attention to the operations of an impostor, whose method of procedure is described as follows: He represents himself as being thoroughly acquainted with the Mexican trade, and fluently rattles off a lot of names of Mexican business firms. An exhibit follows of letters purporting to be written contracts made by various concerns in this country authorizing the sharper to represent their goods in Mexico. Last but not least, he presents his fee, in the present instance \$35, as partial advance payment.

AMONG THE HARDWARE TRADE.

The Ditz & Mooney Hardware Company, Clarion, Pa., has moved into its new storeroom in the opera house block. It is one of the finest Hardware stores in Clarion County.

D. N. Craft & Sons, 95 West Main street, Uniontown, Pa., have purchased the Hardware stock of H. R. Craft and have combined it with their own, making one of the largest Hardware stocks in Fayette County.

Charles Y. Kay, Hardware merchant, Alliance, Ohio, has had plans prepared for the addition of two more stories to his business block and will also put in an entire new front of pressed brick and stone.

B. C. Gowan, Peshtigo, Wis., has become a partner in the Hardware business of H. B. Simcox & Co., Marinette, Wis. The company will be reorganized and incorporated under the name of the Simcox-Gowan Hardware Company with increased capital, and it is planned to materially extend the business.

The Girard Hardware Company, Girard, Erie County, Pa., has been incorporated with a capital stock of \$10,000. James P. Sherman, B. F. and S. C. Easterbrook and N. A. Wilson are interested in the company, Mr. Sherman being the treasurer.

CALENDARS, Etc.

L. S. WINNE & Co., Kingston, N. Y.: Calendar with weekly sheets.

AMIOT, LECOURE & LARIVIERE, INCORPORATED, Montreal, Can.: Calendar with monthly sheets, especially referring to Builders' Hardware and Bathroom Fixtures.

ERNEST LAW & Co., Philadelphia, Pa.: Calendar with monthly sheets.

KUTZTOWN FOUNDRY & MACHINE COMPANY, Kutztown, Pa.: Handsome art calendar with monthly sheets.

P. F. BURKE, South Boston, Mass.: Nature print calendar, with monthly sheets; also listing and illustrating Toe Calks.

HARRINGTON & RICHARDSON ARMS COMPANY, Worcester, Mass.: Handsome art calendar, with monthly sheets.

THE RALPH BROWN COMPANY, San Francisco, Cal., advises us that its sales from July 1 until December 21 were nearly \$5000 in excess of the total business done by the house during the entire year of 1905. Notwithstanding the fact that the company was obliged to discontinue operations from April 18, the date of the great earthquake, to July 1, a period of two and a half months, sales for the whole year of 1906 will show an increase of more than 30 per cent. over 1905. This is certainly a very favorable showing and is an excellent illustration of the energy and zeal with which the San Francisco people and business men generally have taken in hand the reconstruction of a city which was practically destroyed. The Ralph Brown Company states that over 1000 building permits were issued in the city during November, at a total valuation of over \$7,000,000. Bank clearings during the same month amounted to \$40,000,000, which was more than the total for November, 1905. The banks all report a very heavy business, with largely increased deposits, showing a most healthy condition of affairs.

A RECEPTION AND SUPPER was tendered by the Skinner Chuck Company, New Britain, Conn., to its employees on December 26. The Hotel Russwin was the scene of the festivities, which proved to be of a most delightful character.

THE ANDREWS WIRE & IRON WORKS, Rockford, Ill., tendered a banquet to its employees in the dining room of the factory on December 21. The occasion proved to be a most enjoyable one.

NEW YEAR'S GREETING BY E. C. SIMMONS TO THE HARDWARE TRADE

REMEMBERING how kindly was received last January my contribution to your semicentennial issue, and feeling more and more drawn to all those connected with Hardware interests—manufacturer, jobber and retailer—I take advantage of this opportunity to extend a New Year's greeting of "Peace and Good Will" to every one connected with this most important branch of the commerce of the United States.

A Notable Year.

The year 1906 has been a notable one, particularly marking great progress and improvement in the conduct of the retail Hardware business. My impressions are that the retail Hardware dealers are conducting their business very much more intelligently and successfully than was the custom or condition three or four years ago. Many of them—in fact, I should say most of them—have awakened to a realizing sense that commerce is simply a battle of competition, in which the fittest will survive, and perhaps I might say the "most fittest" will succeed in large measure. This improvement—in my judgment—has come first from necessity, which perhaps is the underlying cause of most of our improvements in a business way; and second, by reason of the merchants meeting together in their State associations—giving an opportunity for exchange of ideas, and learning from each other how best to transact the different parts of the varied business which they conduct.

Commercial Education.

Our retail dealers to-day show a very much higher appreciation of the value of commercial education than ever before in the history of the country, and especially so of salesmanship—realizing that the old adage that "goods well bought are half sold" is obsolete, and that in this day and generation it requires salesmanship—it requires both brains and ability to sell goods to conduct business successfully, and that there is a vast difference between the merchant and the shopkeeper. The shopkeeper is, in a sense, a peanut dealer, who carries two varieties—roasted and raw—and when he sells out all of the roasted, so that his variety is reduced to one kind, he immediately roasts some more and his assortment is complete; but a merchant of the present day is a man who studies the situation of affairs in the length and breadth of this land—cause and effect, supply and demand—adapts himself to the conditions that environ him; but more than that, perhaps the benefits derived from the information conveyed by the traveling salesmen representing the jobbing houses has been more beneficial, has been listened to more favorably, and their suggestions received more kindly than heretofore. On the other hand, the salesmen themselves have more and more become convinced that it is their duty to bring to the notice of their customer anything that will assist him in the conduct of his business. New ideas that they see put into practice in one town are told and explained in the next place they visit; information they receive from their house is conveyed to the customer, modestly, at the proper time and in the proper manner, so as to be of service to him. The salesmen have also learned to value more the true definition of what constitutes a good salesman in the answer that "A good salesman is one who helps his customer to prosper."

Scarcity of Goods.

Therefore, it is quite safe to say that 1906 has been a year of great progress, as well as prosperity, in the Hardware trade at large. The advance in prices which has occurred during the past four months is something that seemed inevitable to keep pace with the general prosperity of the country. A crop from the soil having a value of about \$7,000,000,000 gives the people great buying power. That buying power means greater consumption, so that to-day it is safely argued by the most intelligent minds in our business that consumption has

outstripped production. The result is that goods are very scarce—very hard to get in sufficient quantities, and early enough to supply the enormous demand. The jobbers' stocks are scarcely normal in value and somewhat broken in assortment; the manufacturers have no goods at all on hand; the retail dealers have scarcely the usual amount of goods on their shelves. All this means an enormous and early demand for goods which it is going to be exceedingly difficult to supply.

The Catalogue House Question

is still an unsolved problem, but the retail dealers are realizing more and more that it is a matter of each individual effort as to the injury they are permitted to do to the trade; in other words, many retail dealers have combatted this competition most successfully by activity, intelligence, being watchful and alert on everything that comes into their towns from the catalogue houses, visiting those people who have the catalogue house habit, explaining to them why they should be loyal to their home town and merchant, offering them goods at similar prices, &c., &c.

Tendency to Goods of Higher Grade.

On all sides there is evidence of a strong effort to encourage and cultivate trade on better or higher grade goods, to get away from the cheap, cheap, cheap, and on to goods that have more merit in value. I hold that a good Hatchet is cheaper at 75 cents than a poor one at 35 cents, that a good Hand Saw is cheaper at \$2 than a poor one at 75 cents, and so on with all Tools.

The retail Hardware dealers are recognizing the fact that it is profitable to them to keep fine Pocket Cutlery, and not to allow the drug store to absorb the trade on the finer goods while they sell the 25 and 50 cent Knives only. This reminds me of an incident in my own experience some years ago, where I was in a retail store and a man came in and asked for a Pocket Knife. The clerk showed him a 50 cent Knife, and said, "How would that suit you? It is 50 cents." The man looked at the clerk and said, "What is there about me that looks like I wanted a 50-cent Pocket Knife?" Then he turned to me and, although a perfect stranger, said, "Sir, will you please tell me what there is in my appearance that indicates I want a 50-cent Pocket Knife?" I said, "Nothing whatever, sir; you impress me as a man who wanted a \$3 Pocket Knife." He seemed very much pleased, and said, "Yes, that is about my size."

I therefore strongly recommend the retail Hardware dealers to cultivate a trade for the better class of goods. Let them put in more nickel plated Tea Kettles, high grade Delft Ware or Granite Ware, avoiding as far as possible the cheap stuff, keeping it but hardly ever selling it; keeping a few Pocket Knives of the higher prices or better qualities, three and four blades, well assorted, the best that money will buy, although I would at all times keep some of the cheaper or lower priced goods, that is to say, "keep" them, but not sell them.

Women Should Be Catered to.

It is generally conceded that of all the money spent in stores in the United States 80 per cent. of it is spent by women. Are not most of the retail Hardware stores almost exclusively for men? that is to say, they cater to the 20 per cent. of the money expended in stores, and almost overlook the 80 per cent. spent by the women. Would it not be well to carry more goods to please the fair sex, such as Tinware, Graniteware, Carpet Sweepers, Clothes Wringers, and also sell them at prices to meet department store competition? Get the women of the land in the habit of going into the Hardware stores.

An investment of \$200 or \$300 in House Furnishing Goods of this kind, sold at competitive prices—I mean by that, sold as low as the department stores sell them, even admitting no profit is made on them—would be a splendid advertisement and cost little or nothing. It is astonishing how many goods of this kind \$300 will buy. Any jobber would be glad to help the retailer by selling him a few goods of this class at extraordinarily low prices to enable him to compete; but, if he asks 25 cents for a Tin Bucket that the department store sells at 15 or 20 cents he certainly will not attract the trade who

buy that class of goods. Retail dealers must get over the idea that they can get these enormous profits. There are certain goods so competitive that they cannot be sold in any quantity unless they are put at what is practically department store or catalogue house prices.

If women get into the habit of going into the Hardware stores they will bring their boys with them, who will in their early youth imbibe a fondness for the Hardware store with its many attractions of Cutlery, Tools, Fire Arms, &c. It is a great thing to get the boys in early.

Pictures and Illustrations.

Let me call attention to the great influence that pictures or illustrations are having in this age. Think what they have done in political life. Remember the pictures of the Hon. James G. Blaine, with the words, "Rum, Romanism and Rebellion," which defeated him in his run for the Presidency of the United States. Think of the pictures that now appear in the advertising parts of our monthly magazines, where you buy a magazine composed of one part magazine and three parts artistic advertising, in which some handsome pictures are shown. The commercial use of illustrations has never been better demonstrated than by the great catalogue houses, who perhaps first touched the chords of human sympathy by getting out a book containing more pictures than any other book ever published before in the world. I believe the love for pictures which we imbibed at our mothers' knee, when she showed us "Little Red Riding Hood," "Old Mother Hubbard" and "The Little Pig that Went to Market," has been there ever since, and perhaps has increased in strength, so that to-day pictures are a tremendous influence in many of the occupations or experiences of life. The Hardware trade make great use of them in their catalogues, and now the retail dealers are coming to the front and using them. We have received recently a great many advertising circulars or sheets of Christmas goods, with the pictures of the various different things they have for sale—clearly showing a new era of enterprise and the use of modern weapons in commercial warfare.

Business Simplicity.

Merchants are realizing more and more that the simplest and straightest methods in business are the best; that dodging or evading, that tricks or sharp practices are unprofitable, unwise and beneath the dignity of a man who classes himself as a merchant; that the truth and nothing but the truth is the proper weapon to use in the conduct of business, and when one does not care to answer a question, it is a very simple matter to say, "I beg to be excused from answering that question," but do not dodge, evade or misrepresent; never try to fool anybody. It is said that a child is the simplest and truest thing in the world. Let us, as far as we can, have the simplicity of childhood in the truthfulness with which we conduct our business.

Great Variety in Stock.

The retail Hardware dealers are also realizing more and more that to have a great variety, to have everything that people want when they call for it, is the way to be successful; to order often, and when they are out of the goods, not to wait to make up a large order, but to send in a small one; in fact, to keep the small orders going all the time.

Poor Business Methods.

Let me give three evidences of what I consider poor business methods: Some time ago I was in a retail Hardware store some distance from this city. The merchant was on the top of a ladder counting some of his goods. Two ladies entered; they were very nicely dressed; he turned and called down to them, "Well, what is it to-day?" They asked him for a Granite Milk Pan. He again called down to them, "We haven't any; we are entirely out." He did not get down from his ladder, and did not show the slightest cordiality or give them a particle of encouragement to come back again.

Another case: Within the past year I went three times into a retail Hardware store to buy certain things, and

each time I found there only a boy about 15 years of age, and who knew literally nothing about the stock; yet, the man had a large and apparently well assorted stock of goods, and he perhaps is now wondering why he has not had a more successful business.

In the early part of last January I was in the extreme South, and while in a retail Hardware store there a carpenter came in and asked for a Hand Saw. The clerk took out five different Hand Saws, took the covers off, and laid them before him, and said, "Which do you want?" He made not the slightest effort to sell any particular Saw, or to sell a good one rather than a cheap one, or to sell one that paid him a splendid profit instead of one that was sold at very nearly cost, or at a very small profit. He apparently had about as much idea of the "art" of selling goods as a wooden Indian tobacco sign in front of a cigar store. The sale of this Saw consumed about 15 minutes. This man might have made a dollar for that 15 minutes of his time if he had sold the most profitable and best Saw; on the other hand, he might have made only 25 or 50 cents if he had sold those which are being retailed all over the land at very small profits, and I immediately raised the question with him about selling his time profitably.

You may say these illustrations are exceptions to the rule, but here are three cases that have come under my personal knowledge. I believe that this class of merchants is passing away, and his place is being supplanted by intelligent, live, active business men; yet, even within the past 30 days there has come to my knowledge a case which clearly indicates that the retail merchants are not always willing to co-operate with the jobbers in their efforts to put up sharp competition against the catalogue houses. A traveling salesman saw marked in a man's store a Sewing Machine at \$25—a plain selling price on the ticket. As he had sold this man these machines at \$9.25, and as he had sold them at about cost, to give him a good weapon to fight the catalogue houses with, he felt very much disappointed to find him putting such a high selling price on them. He argued with him that it was a mistake, and that he was defeating the very purpose the jobber had in selling him the goods so cheap. The merchant listened patiently to what he had to say, and then replied, "Well, I bought three of those machines; my wife uses one of them, and she says there is not a better machine in the county, that it is worth \$25, and I am going to get \$25 for it, and I don't care a — what you say." Again, we might say this is an exception to the rule—and perhaps there are more exceptions than we are aware of.

High Ideals.

We want to cultivate more of the sturdy, rugged honesty of the Abraham Lincoln type, and let it penetrate our business lives. Let us all do what we can to elevate the business in which we are engaged. Let us by our daily lives and the conduct of our business convey to others that the business in which we are employed is one of high ideals and high purposes, and most benevolent methods, because I believe that a retail Hardware dealer does a mechanic a service in persuading him to buy a first-class tool, instead of a so-called cheap article. Let us all—manufacturers, jobbers and retailers—begin the year 1907 with clearly outlined views of higher ideals, better, broader and more generous business methods. Let us eliminate all feelings of antagonism or irritation against our competitors, and let us think of each other only as friends and brothers, and lend a helping hand to each other. The great Captains of the future will not be Captains governing the sword and the gun, but they will be Captains of Industry, mighty men of commerce, because commerce rules the world. Let us not forget that in our line of business the manufactured goods of the United States excel those of all the rest of the world.

Co-operation.

Let manufacturers show their good will to those jobbers who conduct their business in such a way as to command their respect, who are not Arabs or price cutters, but who elevate the business in which they are engaged. Let the jobbers in like manner do everything

they can, both through their salesmen, their catalogues and by their methods, to help to educate the retailer in the best methods of conducting his business, pointing out the best ways of meeting hard competition, and the most successful manner of conducting the retail Hardware store; but, let the retailer be "up and doing," watchful, zealous and earnest. Let him carry in stock the goods that people want, and not make excuses for them to send to the catalogue houses for them because "we couldn't get them in our town." This condition has prevailed distinctly upon the items of Bicycles and Sewing Machines. The jobbers have done what they could to help the retailers by using their best influence to have the manufacturers not sell the catalogue houses. The work of the jobbers in this respect is to be commended, but it is not effective and of but little value unless the retailer himself grapples with this difficult problem—and it is not so difficult as it seems.

Let us one and all take an inventory of ourselves, writing our debits and credits on the two sides of the sheet, and trying to increase our credits and diminish our debits by closely adapting our lives to the "Golden Rule."

E. C. Simmons

RUSSELL & ERWIN'S SALESMEN'S MEETING.

RUSSELL & ERWIN MFG. COMPANY held its annual salesmen's meeting at the home office in New Britain, Conn., instead of New York City, as in the past. Between 45 and 50 of the company's travelers were present during the three days' session, December 26-28, representing its branches in New York, Philadelphia, Chicago and San Francisco. Meetings at the factory were held daily, at which Messrs. Hart, Hawley and Caley reviewed the year's progress, outlined plans for 1907, and presented new goods to be offered the trade early in the coming year. These meetings were marked by the interest and enthusiasm that have distinguished the Russell & Erwin organization from the time when Mr. Hart became president and Mr. Hawley as vice-president assumed the direction of its selling force.

After business meetings the salesmen were made guests of the company, of certain of its officials, or of other New Britain manufacturers, and a programme was arranged for their entertainment on both nights of their stay in New Britain.

On Thursday, the 27th, a general reception was given by the company, not to the salesmen alone, but to all foremen and heads of departments in its factories. A committee of factory men—August Burckhardt, Fred. W. Jost and J. A. Morford—decorated one of the local halls for the occasion, erected a temporary stage and set up a Christmas tree for the evening's festivities. An excellent eight-part vaudeville bill provided by artists from the Majestic Theater formed the first part of the entertainment, intermissions being occupied by chorus singing of W. E. Diehl's "R. & E." song and his new lyric, inspired by "Everybody Works the Salesman," called "The Traveling Men."

The vaudeville was followed by the lighting of the Christmas tree and the distribution of presents. The part of presenter, in the role of Santa Claus, was taken by I. D. Russell, treasurer, assisted by George A. Stark as "the motley fool." Each member of the company received a present, many of them pertinent to the fads, follies or weaknesses of the recipients. In the course of the presentations Mr. Russell took opportunity to give to Mr. Hart in behalf of the whole company of salesmen, heads of departments and foremen, a cut glass punch bowl set as an expression of the respect and affection of his associates. Mr. Hawley also presented on behalf of the salesmen a gold watch fob to J. W. Sullivan, who left the company at the end of the year to establish a retail Hardware business at New Rochelle, N. Y. A Dutch supper concluded the evening's entertainment, giv-

ing opportunity for the renewal of old and the making of new acquaintances among the members of the various departments of the company's service.

The invited guests numbered above 100. In addition to Hon. Philip Corbin, president, and Charles M. Jarvis, vice-president, of the American Hardware Corporation, the officers, officials and foremen of the factory, were the following members of the Russell & Erwin selling force, all well known to the Hardware trade:

G. A. Allen.	W. H. Donaldson.	S. J. Parkhill.
W. Ackerman.	J. T. Duyckinck.	F. O. Routh.
S. B. Bispham.	E. G. Ford.	Fred Schrey.
A. G. Bowman.	F. M. Funcke.	W. Steinmeyer.
C. E. Bristol.	George Holsten.	J. W. Sullivan.
G. B. Clayton.	W. P. Hudson.	A. R. Sisson.
J. L. Clayton.	W. Hayman.	C. L. Schlatter.
Chas. Coqueron.	F. S. Hires.	C. H. Snyder.
A. H. Clark.	C. C. Haselton.	George F. Taylor.
R. A. Cranston.	R. R. Leeds.	H. A. Taylor.
F. D. Conklin.	A. L. Le Comte.	T. J. Usher.
R. S. Cornell.	Ransom Lamb.	W. C. Usher.
W. A. Cherry.	O. P. Malone.	S. C. Van Antwerp.
H. B. Coleman.	A. Miller.	J. H. Van Newkirk.
W. E. Diehl.	J. O. Muller.	F. Williamson.
F. G. Draper.	C. McKenna.	

Through the courtesy of Mr. Hart and Mr. Hawley all the guests of the preceding evening, together with their wives or sweethearts, were present at the production of "His Honor the Mayor" at the Russwin Lyceum on Friday evening. The Russell & Erwin party numbering about 160, were seated in the center of the theater; the entire balcony was engaged by Landers, Frary & Clark for their salesmen and foremen; P. & F. Corbin, Corbin Screw Corporation, Stanley Works, Stanley Rule & Level Company took large blocks of seats; the boxes were occupied by heads of the manufacturing interests of New Britain, and little but the galleries was left to the general public. It was essentially "manufacturers' night," and probably at no time previously had so large, so representative and so cordial an audience been assembled in New Britain.

An after-theater smoker and luncheon at the Hotel Russwin, courteously tendered the officers and salesmen of Russell & Erwin by George P. Hart, vice-president of the Stanley Works, and Alix W. Stanley, vice-president of the Stanley Rule & Level Company, followed the play and was attended by officers of the principal manufacturing companies of New Britain. T. J. Usher of Chicago, as self-appointed toastmaster, presided with his accustomed ease of manner, and songs and speeches brought the social side of Russell & Erwin's salesmen's meeting to a close.

The material advantages of holding such meetings at the factory, where an insight into the manufacture of the goods which they are selling can be obtained by the salesmen at first hand, are so obvious as to assure the continued choice of New Britain as the place for the annual gathering. The social side is equally to be considered. The close association, understanding and good fellowship of those engaged in the various departments of the company's work foster and increase the friendliness, enthusiasm and unity of purpose which have, under the leadership of Messrs. Hart and Hawley, so greatly advanced the interests of the Russell & Erwin Mfg. Company in the past four years.

SOUTHERN JOBBERS WILL MEET AT RICHMOND.

It has been determined to hold the next annual meeting of the Southern Hardware Jobbers' Association at Richmond, Va., June 11-14. The headquarters and place of meeting will be the Jefferson Hotel, and those who desire reservations made for rooms are requested to communicate directly with the hotel management.

SUPPLER HARDWARE COMPANY, Philadelphia, Pa., has installed an elaborate exhibit of its line of Pennsylvania Lawn Mowers at the New Zealand International Exposition. The company's Great American Ball Bearing Machines with Braun grass catchers have been adopted by the exposition commission for cutting all the lawns within the enclosure.

Letters from Manufacturers on the Business Outlook.

We give below extracts from letters from representative manufacturers in the Hardware field, in which they refer to the prospects for business. It will be noted with satisfaction that the outlook for 1907 is regarded by them with substantial unanimity as exceedingly promising.

From American Fork & Hoe Company, Cleveland.

The prominent feature of the Steel Goods market is the low price of the goods and, second, the great demand for them. Farmers have done so well that they have bulging pocketbooks, and the goods are so cheap \$5 will suffice to acquire all that they need for the use of a large farm. Weather conditions affect the sale of Hand Farming Tools. For instance, a dry summer

Farmers Prosperous.

will curtail the call for Hay Forks as well as other Tools. What is true in Steel Goods is true in all lines, and pretty much all over the world, except possibly a little quietness in Russia and South Africa. In the latter country they have not yet recovered from the ill effects of the Boer War. We can see fairly well into the future up to midsummer, 1907. Beyond that it is a little hazy, but we do not look for troublesome times after that date in the near future, unless we should have a complete, or nearly complete, failure of a great crop, such as the corn crop, which would affect the supply of corn, hogs and cattle, and tonnage for transportation; or, in the South, a general failure of the cotton crop, which would, of course, be followed by a depression.

From Standard Chain Company, Pittsburgh.

The Chain business in the year 1906 participated in the general prosperity throughout the country, and notably that of the iron and steel business. The Standard Chain Company was somewhat handicapped at the beginning of 1906 by reason of its stand for the "open shop," and at the opening of this year had not recovered from the long strike which commenced in July, 1905. At this writing, however, all of our plants are filled with workmen, fully employed, and all are being operated on the "open shop" basis. With the succession of good crops and the great extension in railroad business the demand for Chain has been large, but the manufacturers of this country have put themselves in a position to amply take care of it in 1907.

Fight for Open Shop.

Some difficulties and misunderstandings have arisen in the year just closing on account of the laxity of interpretation of contracts, and our jobbing friends, relying upon this laxity, not sending in their specifications at the dates named in their contracts, have, therefore, naturally been disappointed in not receiving prompt shipments during the height of the season. They attribute this delay to the factory, whereas if their specifications had arrived in ample time the delay in shipment would at least not have been so great. The great difficulty in securing, first, the raw material, and thereafter the cars with which to load the finished product, are two factors tending to delays in shipments which are not fully appreciated, by any means, by the dealers. In justice both to the buyer and the seller there must be a more complete understanding and a stricter compliance with the contract in this respect, particularly as the large producers of iron and steel in its various branches are very rigid in their interpretations of contracts. We all learn by experience, and I feel confident that during the season of 1907 there will be a more clear understanding of just what a contract means and how necessary a definite understanding is at the time the contract is made.

Interpretation of Contracts.

The outlook for 1907 is unquestionably bright, as both

the manufacturers and jobbers have no stock on hand of finished goods, and with high prices for farm products and a great demand for all iron and steel manufactured goods, we look forward to a large business

Outlook Bright.

the coming year and are making every preparation to take care of it. Prices have been quite stable during the past year, and I look for the same stability during 1907. The manufacturers of Chain, as a rule, have been most conservative in their advances, and the prices of Chain have only followed the advanced cost of raw material.

From Henry Disston & Sons, Philadelphia.

Referring to the outlook for 1907, we have never made a practice of indulging in prophecies, feeling that this is dangerous. Our business during 1906 was unprecedented, the increase in sales over 1905 being over one million dollars. In analyzing this increase we have been gratified to see that it has been largely in our higher grade goods. Our own brand Saws have formed a very large part of this increase.

It has always been our policy to avoid making unnecessary advances, and it is with reluctance that we have been compelled to announce prices for 1907 which are on many lines in moderate excess of those of 1906; but these advances are only sufficient to cover the actual advance in cost of material.

The increased popularity of our Files is also gratifying, we now having orders on hand which would run our File plant for 90 days if no further orders were received.

Our 3500 employees are prosperous and happy, and it is a source of satisfaction to know that they are loyal to our interests and proud of the reputation of our goods. We do not encourage speculative buying for 1907, but feel that at this time one year hence, we may still ask, "when will this prosperity cease?"

From Goodell-Pratt Company, Greenfield, Mass.

The enormous volume of business that we are all transacting, or endeavoring to transact, is by no means the least of our troubles; far greater are those bearing upon the procuring of material and supplies for the making of the goods with which to supply the wants of

Scarcity of Material.

our customers. Another serious problem is that involving our costs of production, and here we are again "between the devil and the deep blue sea." If we don't increase our selling prices we cannot continue to show a profit; if we do increase them—well, the purchasing power of the consumer, particularly the mechanic who is working for a wage, is already strained, and herein lies the danger. We do not quite agree with our esteemed Secretary of the Treasury when he asks that we be spared greater prosperity, but we do believe that there are grave dangers which may materially affect our present condition unless the standards of value be kept within reasonable bounds. We can only hope that those captains of industry who are responsible for the direction and management of our greatest

Responsibility of Great Interests.

interests may act wisely and well; many eyes are upon them, and their example will be largely followed. If we could be sure that the same sound policy of a

Letters from Manufacturers

square deal which has always been conspicuous in the management of *The Iron Age*, would be adopted as a standard by other captains of industry we might well feel that this present period of prosperity would be continued for many years to come. There is much work to do, and the wages paid in doing it scatter our prosperity far and wide, and the more people that are prosperous the longer will the prosperity continue.

From American Hardware Corporation, New Britain.

The year past has been one of great activity in all classes of manufacturing. The crop yield was the largest in the history of this country, and Mother Earth returned more in dollars and cents than ever before. The product of the mines in the shape of precious metals exceeded anything heretofore taken from the earth in the same period of time. With these two factors working together to increase the material wealth of the nation it will take some extraordinary event to change the natural order of things. Without doubt we are on the top wave of prosperity and we should move with care, but with the extraordinary products of the soil and the mines during the year 1906 we confidently expect the year 1907 will be the best year in the history of the country.

From National Sewing Machine Company, Belvidere, Ill.

Our business has been exceptionally brisk; in fact, the demand for our goods has been the greatest in the past year that we have ever experienced. Collections have also been extremely favorable, and as to the future we see no reason why the present prosperity should not continue indefinitely, unless there should be some radical political upheaval that would bring about a state of uneasiness and distrust in the business and financial world. We feel that the present and near future is not necessarily to be judged by the past; in other words, that conditions have changed so materially that it is not necessarily true that history must repeat itself, and that we must go into a state of depression, occurring at intervals of almost the same number of years. This country is vastly different in its material prosperity as compared with a very few years ago; in fact, prior to the last decade the country was in a very undeveloped state as compared to the present time. Railroads were not prosperous, securities were held in foreign countries, and at the slightest alarm were dumped here, taking away our gold and making a tight money market, with the usual consequence. The West had been developed very rapidly on borrowed capital; it had poor crops and was badly in debt. These conditions are now changed—our railroads are prosperous and are practically owned by our own people; our Western country has been getting rapidly out of debt; we have also learned through experience how to raise fine crops in sections wherein at first they could only get a crop once in a number of years. The country is now so well fixed financially in a general sense that what may happen in Wall Street, as it is popularly termed, would make very little difference in the country at large. For instance, see what little attention was paid to the life insurance and other exposures and scandals. It is fair to presume that a few years ago such things would have precipitated a serious panic. The country has been blessed for a number of years with extraordinary crops of a very diversified nature, to say nothing of our numerous metallic and mineral productions. There has also been a vast export balance in our favor. We see no signs as yet of overproduction; in fact, the purchasing and consuming power of the people seems in excess of any overproduction in the near future. The

inability of the railroads to transport goods seems to protect us from overproduction for some time to come. It is reasoning along such lines as the above that convinces us that under all ordinary conditions this country should enjoy a great degree of prosperity for a number of years to come, or until something now unforeseen arises.

From E. C. Atkins & Co., Indianapolis, Ind.

We do not think there is anything we can say that would add to the general knowledge of the situation. Everybody who reads at all is doubtless well posted as to how things are to-day. We cannot see anything to hinder a continuation of the present prosperity during the year of 1907, and if the crops for the new year prove to be up to the average of the past few years, it would seem as though good times ought to continue without interruption during 1908. We see a good deal said by the pessimists about there being "too much prosperity," which reminds us of the old saying that "Some people would kick if they were in Heaven." We do not believe in allowing prosperity to run away with one's good judgment, but we think it is rather unnecessary for good people to borrow trouble on that score because the majority of the American people are pretty level-headed and are appreciating whatever portion of prosperity they are enjoying. It is, of course, the proper thing to have a watchman on deck, to see that the ship keeps in a straight course, and to call attention to any danger that may be seen ahead, so that we may steer clear of it, but we cannot see the advantage of trying to think that we have trouble already with us by claiming that we have "too much prosperity." As far as we are concerned, we think that we can stand such bad luck (?) for several years to come.

From Landers, Frary & Clark, New Britain, Conn.

We expect that the present prosperous business conditions will continue through 1907. We believe that on account of the high cost of materials and the steadily increasing advances in labor all those lines of goods which have not participated as yet in the general advance in prices will be compelled to do so. In general, we look for greater business activity in 1907 than in 1906, and at a rather higher range of prices.

From L. S. Starrett Company, Athol, Mass.

The most prominent feature of the situation in our business and the one which is giving us the most concern at present is our inability to make goods as fast as people demand them. With our present facilities it is impossible to keep up with our orders and we are now building an addition to our factory 288 ft. long, which is nearly ready for the roof. With this addition our floor space will amount to nearly 4 acres. We hope before long to be able to increase our output fast enough to fill our orders with the promptness which our friends in the trade deserve and which we always try our utmost to give. We notice that other people are in the same condition, particularly in the machinery line. We are compelled to wait weeks and months for almost every machine we order. We do not have so much trouble in getting steel and other material and supplies, but deliveries of this class of goods are also somewhat slow.

From F. E. Myers & Bro., Ashland, Ohio.

Trade at present is very good, and in our opinion will remain good for at least another year. This, however, depends largely on crop conditions and also on what the banks will be able to do in the furnishing of increased funds for the increased business, or rather the increased funds required for the same volume of business, owing to the largely increased cost of material, labor, &c., re-

quired in the production of an output equal to what we have had heretofore. We have realized a full measure of the general prosperity, and we are making our plans for a corresponding condition during 1907.

From White Mountain Freezer Company, Nashua, N. H.

The outlook for the sale of Ice Cream Freezers for 1907 is fairly good, but the short ice crop throughout the country last winter, with the corresponding high price of that commodity during the summer of 1906, resulted in a more limited sale of Freezers during the past season than the general commercial conditions of the country would seem to have warranted. Hence the demand from certain sections for early shipment this coming season is rather disappointing. Everything considered, if the manufacturers of Ice Cream Freezers secure an average volume of business in 1907, they ought to be well satisfied.

While the cost of many lines of raw material that enter into the manufacture of an Ice Cream Freezer is higher than a year ago, to say nothing of labor cost, we have decided to make no change in our prices for the coming season and are accepting contracts on that basis. If a liberal supply of ice is secured this winter, the sale of Freezers ought to be larger this coming season than for the past year.

From American Iron & Steel Mfg. Company, Reading, Pa.

The whole world seems to be busy, and everybody in this country particularly so, with no present signs of any thunder clap. "Like causes produce like results," they say, and if the causes which operated in former periods of industrial depression existed in like manner, and to the same extent now as then, doubtless we would soon experience a decline in the present abounding confidence, followed by a more or less severe business depression. But we cannot see any signs of recurring financial or industrial failures, and therefore can see no reason why the present active and prosperous condition of industries may not continue indefinitely, especially in this country.

From Joseph Dixon Crucible Company, Jersey City.

The business atmosphere seems serene and with few or no signs of clouds or storms overhead or in sight. Our Graphite Products, Pencils, Graphite Lubricants, Crucibles, Stove Polish, Graphite Paints, &c., appeal to a wide audience and are good barometers of trade. These barometers read for 1907, good business weather, no violent changes. The year 1906 broke all records for us and we look to 1907 to beat 1906.

From Capewell Horse Nail Company, Hartford, Conn.

Replying to your favor of the 13th inst., we will say that our business during the present year shows a large increase over our business of the year preceding. This, however, is not an unusual condition and apparently has nothing to do with the general prosperity which cheers the country, as our business has had a habit of steadily increasing year by year during many years. The outlook for 1907 is not discouraging.

From E. J. Martin's Sons, Rockville, Conn.

Regarding the present situation from our point of view, our business is confined to the large jobbing trade, and all of our customers have placed very large orders with us; in fact, the largest we ever received. The business outlook for 1907 is the brightest in the history of our line making career.

From a Large Manufacturer of Bolts.

Business conditions with us are most encouraging and perfectly satisfactory so far as the demand and prices are concerned, but we are having very great difficulty in procuring raw material and in obtaining satisfactory labor. We do not know any reason why the present prosperous condition of the country should not continue for months to come. The only possible trouble, as we see it, may come from the existing condition of the money market. This we hope, however, will straighten itself out in the near future.

From a Leading Manufacturer.

The Axe business has been large in volume, but not profitable, because of the extremely low prices at which practically the year's production was sold last spring, and of reduced output and consequent increased cost because of extreme labor shortage, particularly in the grinding departments, and also because of advances in cost of materials and handles throughout the season. The prospects are favorable for another year of satisfactory consumption or demand, and the indications are that the cost of production will further increase and the shortage of labor continue, particularly when outside operations are resumed next spring. It follows that manufacturers must secure a very considerable advance over the prices at which they contracted last spring if they are to make any money during the coming year. At present quotations are from 25 to 75 cents per dozen higher than last spring, and it seems probable that the average advance in prices for Axes next season will be not less than 50 cents per dozen and should be more to afford a reasonable profit to the manufacturers.

From a Prominent Manufacturer of Tacks.

The year 1906 closes with us with warehouses practically empty of all kinds of goods that we manufacture, and prices very firm, with a rising tendency. What the immediate future has in store for us is very plain, and that is that there will be a great demand for our goods during the winter and early spring. The puzzle, however, is what the late spring and midsummer and fall have in store for us, especially while raw material is so high in price and scarce to get as it is at the present time. It seems, however, as if we were passing over the very crest of the wave and that these months will bring cheaper and plentier raw materials, and a decided lessening in the demand for finished products. We would not, however, like to put this up as a prophecy, because, as stated above, the whole question is too much of a puzzle upon which to venture a prophecy at the present time. We, ourselves, however, shall proceed with caution.

From Morse Twist Drill & Machine Company, New Bedford, Mass.

We think all manufacturing companies in this country to-day have had a very satisfactory year and look forward to the same results for the year to come.

From a Prominent Manufacturer.

We feel very confident that there will be a very large demand for Hardware of all kinds during 1907. There is certainly nothing within the scope of our vision which would seem to indicate a lesser volume than we have done this year, but, on the contrary, we think there is every reason to expect a marked increase, subject only to such occurrences as are beyond the sight of man. Our experience this year seems to indicate that the heavy purchasing was not in the least degree on speculative account, but was to fill actual requirements and a legitimate demand. If this be true, then the stocks on hand at the beginning of the coming year will be exceptionally light, and this applies equally to retailer, jobber

Letters from Manufacturers

and manufacturer. In the early part of the coming year there is every evidence that present difficulties will be in the way of prompt shipments of orders, which will mean that this momentum will have to be overcome before there is any evidence of slackening, at least so far as the manufacturer is concerned.

From a Prominent New England Manufacturer.

We anticipate doing considerably more business in 1907 than we have done in 1906 and have been making our plans accordingly. This is an optimistic view to take, considering the large volume of business done in 1906. We are, however, very confident that we are justified in reaching these conclusions. Prices of all kinds of metals are considerably higher and we see no prospects of any reduction for the first half and perhaps not for the whole year, and consequently prices of Hardware will necessarily rule higher in 1907 than in 1906.

Prices Will Rule Higher.

that we are justified in reaching these conclusions. Prices of all kinds of metals are considerably higher and we

From a Michigan Manufacturer.

We are enjoying a very good business—in fact, are behind our orders—and anticipate the biggest year we have ever had, in 1907.

A CANVASS OF JOBBERS' VIEWS.

The Ford Auger Bit Company, Holyoke, Mass., with a view to obtaining a good idea of the future outlook for business for the purpose of determining the extent to which additions should be made to the company's capacity and equipment, several weeks since sent out a circular letter to a number of the leading jobbing houses of the country containing the following queries:

1. Is the center in which you are located likely to be overbuilt during 1907?
2. When the buildings now in process of construction are completed, can they be rented at profitable rates?
3. Will the present prosperity in the territory that you cover probably continue during 1907?

The company has favored us with the following epitome of the replies received, which will be of interest as reflecting the views of leading jobbers on the points covered by the inquiry:

We have received replies from 64 of the largest jobbers in the United States and Canada. Fifty-eight of these replied that the center in which they are located is not likely to be overbuilt during 1907. Only one was of the contrary opinion, one was doubtful on the question and four did not answer definitely.

Fifty-eight jobbers were of the opinion that buildings now in process of construction can be rented at profitable rates when completed. One answered this question in the negative. One was doubtful and four did not answer definitely.

Our third question, "Will the present prosperity in the territory that you cover probably continue during 1907?" was answered in the affirmative by 57. Six would not venture an opinion for the entire year, but thought it probable that prosperity would continue during the first six months. One jobber covering one of the States in the Middle West stated that owing to local conditions his territory was not very prosperous at the present time, and did not see any prospect of immediate improvement.

Besides answering the questions the jobbers wrote many interesting letters on the situation, and nearly all of them are very certain that the present prosperity is based on good conditions and will continue. Some express a slight fear of tight money this spring, and a few are afraid that excessive advances in prices will be made by manufacturers. In the West the jobbers consider the crops an important factor after the first six months; but in the East the most important thing seems to be that factories are filled up with orders for months ahead, and therefore it seems certain to the jobbers located in the

East that there will be no let up during the entire year. In sections where the lumber business is of importance the outlook is especially bright, and in the far Northwest customers are very happy on account of the plans for new railroad construction during the next few years.

In answer to the third question one very large house answers positively, "From the Atlantic to Pacific? Yes. Sure." One customer is not only certain of the fact that business will be good during 1907, but for a few years after that. We quote from his letter, as follows:

We consider the time of this prosperity to last at least until 1909. The panic will strike us 1911. This is according to ancient usage and usually comes very true, so we are looking forward for the next year or a little more than a year as being the time of the greatest prosperity, highest prices and hardest times to get goods that we have ever seen. We think that you will find that after 1910 things will drop and continue so until it reaches "panicky" times. This is the way the writer feels, and would like to have you keep this on record and see whether you can put me down as a prophet or not.

REPUBLIC STAMPING & ENAMELING COMPANY.

AN advance price-list covering the line of goods now under way has been issued by the Republic Stamping & Enameling Company, Canton, Ohio. This concern has recently begun operating its new plant and announces that it can make deliveries of the Old English Gray Enameled Ware and other goods covered in the price-list in ample time for 1907 spring business. A complete illustrated catalogue containing many additions to the line will be issued later. The company has adopted the standard list of prices on Gray Ware, and announces that its sizes are fully up to the standard. It also states that its goods are well finished and labeled in an attractive manner.

DEATH OF W. BOWMAN CUTTER.

W. BOWMAN CUTTER, one of the prominent Hardware merchants of Roxbury, Mass., died at his home in Dorchester recently, after a long and successful business career. He established the business at Roxbury 32 years ago, in partnership with Augustus Hardy. After a short time the partnership was dissolved, and Mr. Cutter continued alone. The business grew rapidly, and Mr. Cutter enlarged his field by establishing branch Hardware and Paint stores at Ashmont and Dorchester. Having been trained as a boy in the Sash and Blind business he carried on this line in connection with his Hardware trade. He was a veteran of the Civil War, serving with the Fifth Massachusetts Regiment and with the Charlestown Cadets, and was a Mason. He leaves a son, George O. Cutter, who for some time has had charge of his Hardware interests, and a daughter.

THE MILLER LOCK COMPANY, Philadelphia, Pa., has secured the services of J. T. Rader and E. A. Sherlock to represent the company to the jobbing trade of the United States and Canada during 1907. Mr. Sherlock was for several years with the Park Steel Company and later with A. M. Castle & Co., Chicago. He will look after the company's interests in New England, Canada east of Winnipeg, New York, Pennsylvania, Ohio, Indiana, Michigan, Illinois, Iowa, Wisconsin and Minnesota. Mr. Rader was formerly connected with the International Cutlery Company and the Fremont Razor Strop Company, Fremont, Ohio, and is well known to the jobbing trade. He will represent the Miller Lock Company to the Southern and Western houses and also look after business in Canada from Winnipeg and westward.

CHARLES E. SAYLOR for several years buyer for Burhans & Black Company, Syracuse, and recently connected with the sales department of Russell & Erwin Mfg. Company, on January 1 became associated with Surplus, Dunn & Co., 74 Murray street, New York, representing them in the Southern territory.

System for the Retailer.

Fifth Article.

SELLING BUILDERS' HARDWARE.

BY JOHN A. MANSON, BURLINGTON, VT.

ONE of the most essential equipments in building up a Hardware business is knowledge of Builders' Hardware—ability to sell the finer goods from plans and specifications. A co-ordinate requirement is alertness and energy in following up prospective orders. Trade belongs largely to the man who gets after it. An old time establishment and reputation cut little figure today, unless backed up with modern methods and hustle.

Merchants Must Master the Line.

Too many Hardwaremen rely on the factory builders' Hardware salesman, with his trunk of samples, to make a sale of a special trim, which he (the Hardwareman) should have made from his own line of samples. The

D. B. Barton's House

Basement	1 Lathes Door 14 in
	1 Outside Door 1 1/2 in
	4 Inside Doors 1 1/2 in
	4 Windows. Hinged at top
	5 Windows. Hung with muffle
First Floor	1 Outside Door 3'6" x 7'6" x 2 1/2" Lft. Hl. 1/2 in
Front	1 pr. French Windows 2'7" x 2 1/2" 1/2 in
Back	5 Inside Doors 1 1/2 in
	1 Inside Door 1 1/2 in (to kitchen)
	1 Dbl. Acting Door 1 1/2 in (to kitchen)
	5 Windows. Hung with muffle
	2 prs Casement Windows. 1/2 in
Second Floor	1 Outside Door 2'10" x 7' x 1 1/2 in Lft. Hl. 1/2 in
	3 Inside Doors 1 1/2 in
	1 Dbl. Acting Door 1 1/2 in (to Dining Room)
	3 Transoms. Hinged at bottom
	5 Windows. Hung with muffle
Third Floor	1 Outside Door 1 1/2 in (to balcony)
	8 Inside Doors 1 1/2 in
	2 Inside Doors 1 1/2 in (from Hall opening at back)
	1 Inside Door 1 1/2 in (to room)
	10 Windows. Hung with muffle
	2 Windows in Bath Room Hung with muffle
	1 pr. Casement Windows. 1/2 in
	4 Inside Doors 1 1/2 in with Transoms Hinged at bottom
	3 Closet Doors 1 1/2 in
	1 Inside Door 1 1/2 in opening into Bath Room
	5 Windows. Hung with muffle
	1 Window in Bath Room Hung with muffle

Schedule No. 1, List of Doors, Windows, etc., to Be Trimmed.

merchant who masters Builders' Hardware has enough samples to show the prospective buyer who is looking for something better than the regular stock, knows how to suggest selection and how to figure the job intelligently and give the customer some idea of when he can supply it from the factory. Buyers of the finer grades of Hardware readily appreciate that the factory needs time to get out a special trim, when told that the leading makers of Builders' Hardware supply more than a score of finishes of many designs, and that the goods must be made up when ordered. The successful dealer in Builders' Hardware also has a stock well adjusted to the demands of his trade, and furnishes right from his shelves the common and medium classes of goods. This merchant handles Builders' Hardware just as smoothly as any other part of his stock, and finds no trouble in making a percentage of profit on it equal to the percentage of profit on his entire business. Often such orders are taken

Before the Ground Is Broken

or for a building in some distant town, and the Hardware is shipped direct from the factory to the job without ever being seen by the dealer, yet all packages are tagged in such a manner that the goods fit in harmoniously, according to schedule. The hustling Hardwareman follows up the building news, reports and permits, and is right after the job as soon as he hears of it. Beginning with

D. B. Barton

Order rec'd 12/16 - Hatched 12/16

Basement	1 Lathes Door		
	1 Lft 030 x 3700 x 2 in	44	44
	1 Lft 973 - 4 in	8	18
	1 prs 804 Butts - 3 1/2 in	12	18
	1 Outside Door		
	1 Lft 227 x 3700 x 3 1/2 in	170	170
	1 prs 804 Butts - 3 1/2 in	12	18
	4 Inside Doors		
	4 Lft 030 x 3700 x 3 1/2 in	6	160
	4 prs 804 Butts - 3 1/2 in	12	48
	4 Hinged Windows		
	4 prs 804 Butts 2 in	8	20
	4 1120 - 3 in. Butters	2	08
	4 40 - 3 in. Hooks & Eyes	2	08
	5 Hatched Windows		
	5 1/2 3830 Lath Butters	5	25
	5 1/2 407 Lath Lifts	3	16
First Floor	1 Outside Door 2 1/2 in L.H.		
Front	1 Lft 1344 x 241 x 770-31 x 771-09	200	950
	1 prs 241 Butts 3 x 3	70	100
	1 Ball Ball 241 1/2	150	150
	1 pr French Windows		
	1 Lft 281 1/2 x 241 x 770-67 x 770-60	300	350
	3 prs 241 Butts 4 1/2 x 4 1/2	31	93
	2 Mot. Floor Balls 241-12 in	100	200
	5 Inside Doors		
	5 Lft 044 x 241	34	16 1/2
	7 1/2 prs 241 Butts 4 x 4	27	240
	1 Inside Door to Kitchen		
	1 Lft 044 x 241 x SR 5491 x SR 5492	220	220
	1 prs SR 241 Butts 4 x 4	27	41
	1 Dbl Acting Door to Kitchen		
	1 pr 336 Dbl Act. Butts	34	3 1/2
	1 Push Plate 770-57	12	1 1/2
	1 Push Plate SR 5491	30	30
	8 Hatched Windows		
	8 1/2 1830 1/2 Lath Butters	28	200
	16 1/2 770-32 Lifts	34	402
	2 prs Casement Windows		
	4 prs 241 Butts 3 x 3	21	84
	4 1/2 1551-3 in Bolt	20	80
	4 1/2 43-10 in Casement Adapters	90	360
	2 1/2 12162	35	70
Second Floor	1 Outside Door		
Back	1 Lft SR 237 x SR 5491 x SR 5492	240	250
	1 prs SR 241 Butts 4 x 4	27	41
	3 Inside Doors		
	3 Lft SR 162	80	240
	4 1/2 prs SR 241 Butts 4 x 4	27	122
	1 Dbl Acting Door		
	1 pr SR 336 Dbl Butts	34	3 1/2
	2 Push Plates SR 6796	30	100
	3 Transoms Hinged at bottom		
	3 SR 093 x 1/2 prs Transom Lifts	40	120
	3 prs SR 241 Butts 2 1/2 x 2 1/2	15	44
	5 Hatched Windows		
	5 1/2 1830 1/2 Lath Butters	28	128
	10 SR 487 Lifts	6	60
Third Floor	1 Outside Door to Balcony		
	1 Lft 1344 x 241 x 770-60	420	420
	1 prs 241 Butts 4 x 4	27	41
	8 Inside Doors		
	8 Lft 713 x 241	850	2800
	12 prs 241 Butts 4 x 4	27	324
	2 Inside Doors from Hall opening to back		
	2 Lft E 117 x E 241 x 241 x E 770-60	310	750
	3 prs 241 M Butts 4 x 4	24	90
	1 Inside Door, Bal Room opening to Bath Room		
	1 Lft E 117 x E 241 x 241 x E 770-60	400	400
	1 prs 241 M Butts 4 x 4	24	45
	10 Hatched Windows		
	10 1/2 1830 1/2 Lath Butters	28	210
	2 1/2 770-32 Lifts	34	604
	2 Hatched Windows in Bath Room		
	2 E 1830 1/2 Lath Butters	28	50
	4 E 2218 Lifts	20	80
	5 prs Casement Windows		
	10 prs 241 Butts 3 x 3	21	210
	10 1/2 1551-3 in Bolt	20	200
	10 1/2 43-10 in Casement Adapters	90	900
	5 1/2 12162	35	174

Schedule No. 2, List of Hardware Selected for the Trim.

Third Floor	4 Inside Doors with Transoms Hinged at Butts		
	4 sets SR 162	18	320
	6 per SR 241 Butts 3/4 x 3/4	24	144
	4 SR 093 - 4 ft Transom Lefts	40	160
	4 per SR 291 Butts 2 1/2 x 2 1/2	15	60
	3 Closet Doors		
	3 sets SR 045 x 54 1/2 x 54 1/2 3/4	70	210
	4 1/2 per SR 241 Butts 3/4 x 3/4	24	108
	1 Inside Door opening into Bath Room		
	1 set E 157 x E 157 1/4 x E 259 7/8	115	175
	1 1/2 per 24 1/2 Butts 3/4 x 3/4	27	41
	5 Hinged Windows		
	5 SR 1030 Sand Fasteners	12	60
	10 SR 5497 " Lefts	8	80
	1 Hinged Window into Bath Room		
	1 E 1030 1/2 Sand Fastener	25	25
	2 E 2218 " Lefts	20	40
			164 40

Conclusion of Schedule No. 2.

Nails, Building Papers, Sash Pulleys, Blind Hinges, Sliding Door Hangers, First Needed. Sash Cord, Sash Weights and Sash Fasteners, he follows the job systematically along, and is taking up the matter of "the trim" in ample time to have it when required.

Schedule No. 1 gives a list of doors, windows and transoms, with the necessary details, as taken from a set of plans for a colonial type of house, the Hardware for which was to be selected by the owner. A person building a house

Looks to the Hardwareman

for suggestions, and the merchant who is interested in Builders' Hardware takes particular pains to supply the designs, finishes and grades that will be thoroughly in keeping with the grade and character of the building.

Schedule No. 2 illustrates the same list, after the Hardwareman has gone over matters carefully with the owner, showing samples and obtaining some of his ideas. The decision is—Plain design, amber finish Hardware for the basement; oval beaded design, old copper sand blast finish for rear of first floor; Cut Glass Knobs, with bronze trimmings, for main part of first floor and second floor, and oval beaded design, old copper sand blast finish, for third floor. All inside Hardware of the bathroom is of nicked finish to correspond with bathroom fixtures.

Use of Letters and Numbers.

An explanation of the manufacturer's letters and numbers indicating the styles and finishes of the Hardware included in schedule No. 2 may be of interest. Take S R 162, for instance. S R indicates copper sand blast finish and 162 indicates a complete set, consisting of a No. 1327 Lock, with No. 5491 Knobs and two No. 5492 1/4 escutcheons, all condensed in the one number, 162. On the other hand, many other sets carry separate numbers, as, for instance, 045 (Mortise Latch) x 241 (Glass Knob, with round roses). Similarly we have S R 227 (Mortise Knob

Lock) x S R 5491 (pair Knobs) x $\frac{2}{S R 5492 \frac{1}{4}}$ (two roses and escutcheons combined). In the last item the figure 2 above the line calls for two articles represented by the number below it. Generally when more than three numbers are used in a set it means that the door has one design or finish on one side and a different design or finish on the other.

As already suggested, the advice given by the Hardwareman to the owner should be based upon the character and finish of the building. Very often the owner is not inclined to put as much money into the Hardware as the building should have, or he has erroneous ideas as to the style and finish which will correspond with his architecture, but is ready to consider the experienced judgment of the Hardwareman.

System of Delivery.

A bill of Hardware like this may be supplied from stock, or part from stock and part ordered from factory or all from factory. The stock items might be prefixed with an "S," signifying that they are to be supplied from stock, and the items to be ordered from factory prefixed with an "O," signifying that they have been so ordered. The customer might want some of the Hardware sooner than others, the Butts, for instance, and yet would prefer to have all of the Hardware charged up on completion of order. In such case the goods delivered might be checked out by prefixing a check mark (✓) and also noting date of delivery. A portion of the schedule, showing how the above letters are prefixed and how items from stock are checked out when delivered is reproduced herewith.

Third Floor		1 Outside Door 2 1/4 in. L.H.		
Front	O	1 set 1344 x 241 x 770-31 x 771-49	900	950
old %	X S	1 1/2 per SR 241 Butts 3/4 x 3/4	70	108
	O	1 Ball Pull 24 1/2	100	107

Portion of Schedule, Showing Items Checked Out and Ordered.

An order of this kind may be sold as priced up in schedule No. 2, or at a lump figure. Some jobs of Hardware, as Government and school buildings, call for an allowance of, say, \$2.25 per door, the Job. \$1 per transom and 75 cents per window, selection to be made by the owner, but paid for by the contractor, who gets the trim. Other jobs clearly specify that the owner is to furnish the Door, Transom and Window Hardware, and that the contractor is to supply all other necessary Hardware of corresponding grades and finishes, as per approval of the owner. The illustration is of this nature, and the following letter, with copy of detailed schedule (No. 2), was sent to the owner when order was received:

"We herewith inclose schedule of Hardware for doors, windows and transoms of your house, as taken from plans and per your selection, and on which we quoted you \$164.40. We thank you for the order, which we have entered for our careful attention, and we will furnish it as requested by September 20. As per your instructions, we will take up with the contractor the matter of Cupboard, Closet and other Hardware necessary to complete and supply it to harmonize in designs and finishes with that which you have selected."

In taking up with the contractor the matter of extras for this job the thorough builders' Hardwareman would see that all necessary Hardware for completion, as Cupboard, Drawer and China Closet Hardware, Coat and Hat Hooks, Base Knobs, Barrel Swings, &c., were included. For instance, he would have in mind the Window Stop Screws or Adjusters and furnish them of the proper finishes to harmonize with the corresponding finishes of Hardware.

Thoroughness Brings Success.

The experience gained in the careful and systematic handling of Builders' Hardware means much to the reputation of a Hardware store. People like to trade where their orders receive thorough attention, and the orders that require thoroughness during the day are many; so the Hardwareman must be right into his business all the time, thinking for and suggesting to the customer, so that the job, large or small, will have every piece of Hardware and Screw necessary for it. This care of details, gained in selling Builders' Hardware, helps in every line, and the Hardware stores that have the reputation of doing things completely command the trade, for knowledge of business is the great essential.

(To be continued.)

J. H. Williams & Co.'s Drop Forging Plant.

J. H. WILLIAMS & CO., 9 to 31 Richards street, Brooklyn, N. Y., in the course of an extended business experience have originated, tested and perfected numerous methods of accomplishing helpful results, not only in the manufacturing and selling branches, but in the production of merchandise in marketable form as well. Although it is unpractical to reproduce here all that is useful in the system, reference to the more salient features may interest many who have not given these details the same attention and care.

This drop forging business was founded by the late J. H. Williams primitively in 1884, in a small wooden structure at Flushing, L. I. The plant was soon after removed to a part of the present site, where it has progressed and grown steadily to its present commanding position. Not only is there the drop forging of innumerable parts for other manufacturers, but the company makes large lines of finished merchandise, which is marketed throughout the world by correspondence and its

for that purpose, with all necessary apparatus and supplies. Two competent men are at hand to administer intelligent first aid, which in the majority of instances suffices, more serious cases being treated professionally. The lavatories, lockers, showers, closets, &c., are all on a generous scale and provision is made in forge and other abnormally hot rooms for the maintenance of reduced temperatures on excessively hot days.

During the year there is a social gathering of employees, which brings together both employees and employers, their families and friends, with occasionally a theater party or other acceptable function. On the occasion of the Dewey parade and celebration in New York in 1899

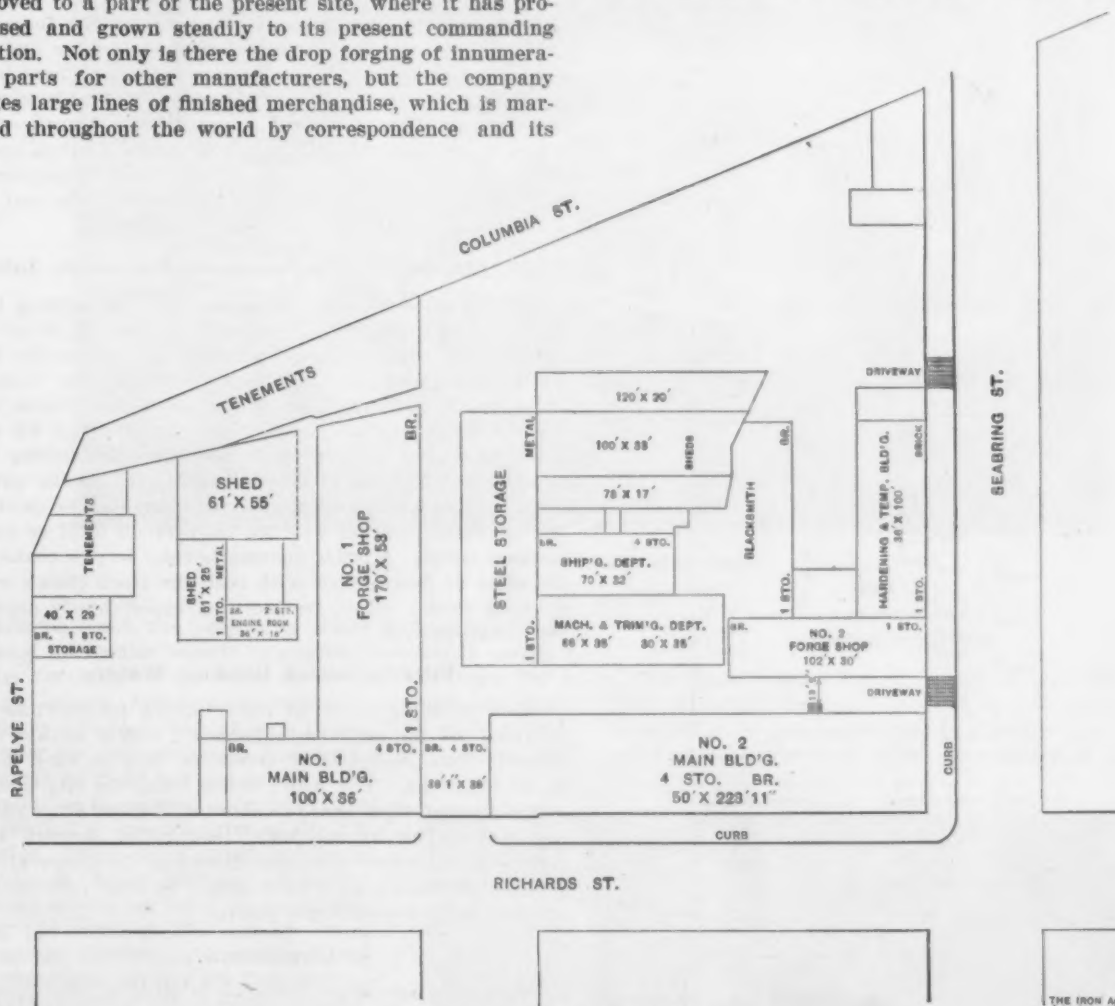


Fig. 1.—Ground Plan of Factory Site.

own selling staff. The company's manufacturing facilities have been greatly increased since the occupation of the existing site in 1885 by the addition of various buildings from time to time, the latest accession being that of a large four-story and basement brick and stone building. Fig. 1 illustrates the ground plan, location and relation to each other of the various structures, covering nearly two large city squares, provision being made for further expansion. Fig. 2 is a partial plan of the fourth floor of the two main buildings.

Consideration for Workmen's Welfare.

Not only have the manufacturing and selling branches of the enterprise been carefully developed, but much time, thought and expense has been given to the material welfare of the large working force in many ways. There are opportunities for intellectual advancement along trade lines, as well as mental diversion in standard fiction, &c., a branch of the city library system being located in the company's reading room. For the operatives injured by accident or suddenly taken ill there is a finely appointed hospital room, planned, built and equipped solely

the company erected at its own expense a large stand for the use of all of the force and their friends; also giving them the day to accept the opportunity. In the adoption of these features, not commonly regarded as necessarily belonging to a commercial establishment, there has been

No Trace of Paternalism or Patronage;

rather the cultivation of mutual good will and the creation of better working conditions of a practical character within reasonable limits. This makes the plant a more desirable place in which to work, and is in turn reflected in the quality of service and output. At the same time a more intelligent and self-respecting force is attracted to the establishment.

The Plant.

The works, Fig. 1, occupy almost two large city squares in one plot. The main building, extending along Richards street, is 300 ft. long, a few minutes ride from the Brooklyn City Hall and less than a half hour from the City Hall in New York. There are four forge shops, a power house, blacksmith shop, building for carpenter work, rough grinding and storage, coal pockets,

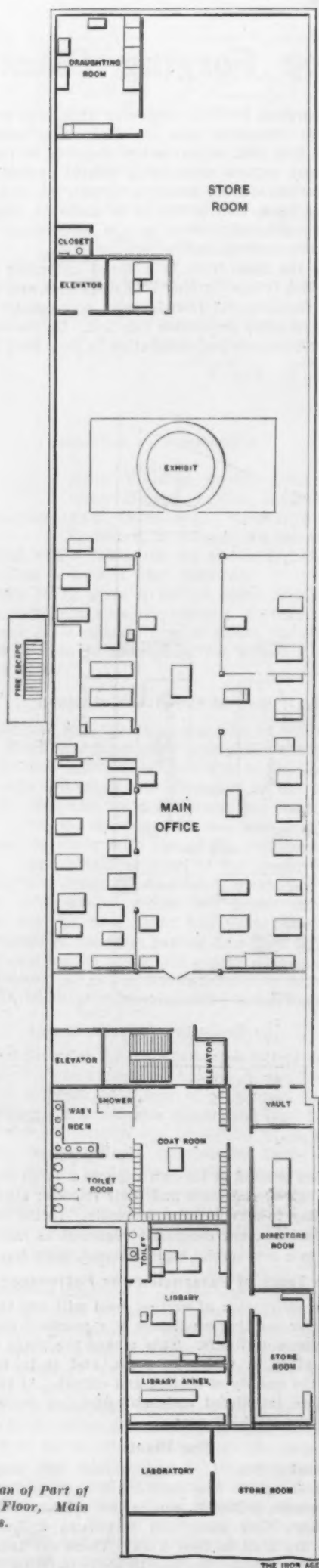


Fig. 2.—Plan of Part of Fourth Floor, Main Buildings.

storage sheds, a case hardening department (separate building) two large oil tanks holding oil for the forge fires and a building for dynamos and transformers, where is adapted the electrical current taken from street mains, which is then distributed all over the system as required. The entire main building is operated exclusively by electrical power.

Fire Protection.

To reduce or prevent fire losses automatic sprinklers are installed throughout the works. Lines of cotton hose, which keeps better than rubber or leather hose for such possible service, are connected with pipe valves at convenient points all over the plant. To man these appliances instantly and effectively when necessary the working force is thoroughly organized, so that in the event of a fire call, real or drill, every individual has a certain station and a specific duty to perform, as far as such service can be prearranged, each floor and department having its own foremen to supervise the force in any contingency. Fire drills occur unexpectedly and at proper intervals, but at least once a month. There is a gong fire alarm on each floor, a steam siren whistle giving simultaneously a general signal for the entire works. There is also an automatic sprinkler service, put in operation at any time by a certain degree of temperature, but which in the forge shops is higher than the rest of the plant to compensate for local conditions.

Vault, Fire Doors, Telephones and Pneumatic Tubes

On the office floor is a fireproof vault for holding important books, papers and valuable documents, in addition to the regular safes. There are automatic fire doors throughout the buildings, controlled by fusible links which, melting at predetermined temperatures, allow the doors to close automatically by gravity. All departments have separate desk telephones connecting by trunk line wires the 31 interior stations with the outer world. Thus a foreman or other individual can be quickly put in communication with an inquirer on local or long distance wires. A brass pneumatic tube service connects the office or fourth floor with both the stock clerk's and shipping clerk's offices, transmitting expeditiously papers and small parcels.

Filtered Cooled Drinking Water.

Pure drinking water at about spring temperature is provided for the entire establishment, and is always obtainable from conveniently accessible taps on each floor in all buildings. The water taken from the city mains is first filtered, then cooled to about 40 degrees F. by passage through an ice machine, then piped through the plant, and to insure constant uniformity in temperature and the avoidance of "dead ends," is kept continually circulating by a centrifugal pump.

Cleanliness.

More than customary attention is given to cleanliness, whether about the office, lavatories, stock bins, work rooms or other portions of the plant. Floors are swept at least once a day and in some instances oftener, and floors, rolling ladders, &c., scrubbed with hot water and soda once a week, while the vitreous china and earthen wash basins, with hot and cold water supply, and kindred conveniences, are kept in excellent sanitary condition by employees who give all their time to such work.

Mutual Aid Association.

All of the shop employees are eligible to membership in the Mutual Aid Association, a beneficial organization conducted and managed entirely by its members—employees of the company. Nearly all of the workmen belong to it, each contributing weekly a fixed trifling amount to the general fund. The participants can choose either of two grades, the greater of which is twice the amount required for the lower grade, the benefits at distribution being in like proportion. As sickness or injury occurs a certain amount is paid to the beneficiary, and in the event of death a funeral benefit is paid.

For the twin purpose of sociability and entertainment, as well as to strengthen the fund, it has been found ad-

vantageous to have occasionally some function such as a ball, theater party, picnic, or whatever appeals to the judgment of the association management, its character varying with the season of the year. The association is now in the most satisfactory and prosperous condition since it was instituted, about seven years ago.

Vacation Fund.

Having in mind the same provident principles, the Mutual Aid Fund is supplemented by what is called the

other similar articles. Another cabinet, of regular hospital character, contains drugs and remedies. There is likewise an assortment of simple surgical instruments. The floor has white hexagonal tiling and the side walls are finished with white wall tiles.

Injuries, both trifling and serious, are common in such a large manufacturing establishment, but the efficiency of the service is being frequently proved by the omission of regular surgeons to disturb dressings, &c., after an inspection of the work as done by the local force.



Fig. 3.—General View of Main Office.

Vacation Fund, the purpose of which is to collect in advance by regular weekly payments, voluntarily made, a sum for distribution when the annual shutdown for a week occurs for making necessary repairs and other betterments best done at such times. The methods governing the collection and distribution of this fund are similar to those relating to the other fund. As the money is received it is deposited by the treasurer of the Vacation Fund in a trust company, where it draws interest. The payments cover a period of 45 weeks during the year, at the end of which time the shutdown takes place. The accumulated savings are then distributed, including the accrued interest, thus enabling all the provident operatives to enjoy a pleasurable vacation without appreciable financial loss.

Hospital.

There is a finely appointed hospital room, Fig. 4, and service always available, this department occupying commodious quarters, well lighted and ventilated. Having regular duties, but near at hand, are two men, competent by training and study to administer expert and intelligent first aid to the injured or sick, whenever any disability occurs. One of the two is a graduate druggist, the other having taken lessons in simple surgery and wound dressing from professionals. The equipment, as the engraving, Fig. 4, partly shows, includes operating room furniture, a hand stretcher, crutches, fixed and portable basins, hot and cold water, a cabinet of bandages, dressings, absorbent materials, ligatures and many

Directors' Room.

The board room, Fig. 5, in which meetings of the directors of the company are held, on the office floor, is about 12 x 30 ft., containing a long directors' table of polished quartered oak, chairs to correspond, and rugs



Fig. 4.—Hospital.

on the hardwood floor. At the northerly end of the room hangs a fine likeness in oil, about three-quarter length, of the late J. H. Williams, draped with red plush draw-curtains, while on the walls are hung upward of 20 engravings, etchings, photographs, engrossed resolutions,

&c., pertaining to manufacturing and related trade subjects, some of which were collected by Mr. Williams himself on European trips.

establishments of repute, which will assume responsibility for proper care and return. The employees are free to take the books home, except those of a purely reference character, for a prescribed length of time, ordinary library rules and regulations governing the transactions.

Reading Room.

There is also a light and commodious reading room for the men, Fig. 7, on the third floor, having a seating capacity of about 100, but capable of holding many more. These accommodations, which include a square Steinway piano, can be used during the noon hour for such diversions as suggest themselves to the employees. There are a number of the leading daily newspapers on file and many of the more important trade papers, some of which are subscribed for not only for the office library, but for the men's library as well. The men are at liberty to take home trade publications that the rest of the force has had a chance to peruse; for example, after they are a week or so old. Some of the employees, ambitious to fit themselves for higher positions and more responsible tasks, spend their spare time after hours in increasing their store of knowledge.

Coatroom.

The coatroom, on the top floor, is solely for the office force. It is furnished with open lockers, which are more

properly partitioned spaces, locker width, open front, top and bottom, with initial-name plates at top to individualize the compartments. Like all the top floor rooms this one is abundantly lighted and ventilated, naturally, by means of skylights as well as side windows. The washroom adjoining is commodious and fitted with six large vitreous china wash basins, with both hot and cold water, together with the customary toilet articles. In a corner of the room is an ample shower bath outfit, one of 19 being shown in Fig. 9, curtain within the partitioned space, to protect



Fig. 5.—Directors' Room.

There is thus in this counsel room a permanent memorial of Mr. Williams and a recognition of the great work done by him in the upbuilding of the business, and in the developing of plans so successfully carried out, looking to the comfort and well being of the employees, and the conduct of the factory on the most approved and humane principles.

Chemical Laboratory.

The requirements of an enterprise of this magnitude and the always increasing clientele taking innumerable subsidiary parts, to be finished and incorporated in products of great diversity and wide range of quality, necessitate the frequent chemical analysis of much material, metals, principally, to determine their suitability and value for specified purposes. This department, Fig. 6, installed in a room about 18 ft. square, is in charge of a thoroughly qualified graduate of a technical institute, who makes an average of from 25 to 30 analyses a week. The laboratory is generously equipped with the latest and best apparatus and supplies for such work.

Men's Library.

The men's library, for their better accommodation, is conveniently located on the street floor, the unit cases containing a collection of books purchased by the company, together with others which have been donated. There is a cyclopedia in many volumes, helpful scientific works, some standard fiction and a supplemental addition loaned by the Brooklyn Library, a municipal institution of great scope, which undertakes to loan monthly a reasonable number of books suited to the requirements of



Fig. 7.—Men's Reading Room.

modern in every way, with a sliding water proof curtain within the partitioned space, to protect



Fig. 6.—Chemical Laboratory.

clothing during the bath. As the office force can go whenever opportunity offers, one shower at this point suffices, but the operatives in the shops are much more liberally provided with shower baths, there being seven each on the second and third floors adjoining the

an illustrated catalogue of Launch Hardware will be mailed on application.

THE PAYSON MFG. COMPANY, manufacturer of Hardware specialties, 1319 Jackson boulevard, Chicago, announces that the Hibernian Banking Association, which was appointed receiver in January, 1905, has been dismissed by order of the court, and that it has again resumed business in its own name. The receiver was appointed at the instance of certain stockholders in order to protect their rights in litigation then pending. The retirement of Edward Payson, who has disposed of his holdings in the company, now renders unnecessary a further continuance of the receivership. It has been further stated that there will be no change in the general policy or management of the business, the corporation assuming all contracts entered into on its behalf by its receiver. The officers of the company are Elijah T. Harris, president and treasurer, and George G. Hunter, secretary.

BEALL BROTHERS, Alton, Ill., manufacturers of Miners' Tools and Supplies, Shovels, Railroad Tools, &c., are extending the compliments of the

season to their customers by means of a unique and effective folder. It is intimated that continued orders from those receiving the folder will materially add to the company's happiness and well being during 1907.

THE WARREN AXE & TOOL COMPANY, Warren, Pa., manufacturer of Axes and Logging Tools of all kinds, has recently acquired the patents and equipment of the American Drop Forging & Tool Company, Wayland, N. Y., and has moved the plant to Warren. New and modern buildings, of concrete throughout, have been constructed, and as machinery of the latest improved type has been installed, the Warren Company is now in a position to turn out the American Pipe Wrench, and other patented specialties and drop forgings in a satisfactory manner.

THE well equipped plant of the George W. Dover Company, Providence, R. I., is devoted almost entirely to the working out of special and intricate problems for the trade in the way of screw machine products. The company confines its operations to brass and sterling silver, and does not touch iron or steel, and is in a position to work from 1-in. diameter down to the smallest piece used for any purpose.

CHICAGO's wholesale Hardware district was again visited by a destructive fire on the morning of Thursday, December 27, which entailed a loss of approximately \$150,000. The building which was practically wrecked was at 107 and 109 Lake street, and was occupied by the Corbin Cabinet Lock Company and the Corbin Screw Company, while the four upper stories were occupied by the Robinson Tubular Furnace Company and Geo. H. Bishop & Co., manufacturer of Saws.

THE HANBURY HARDWARE COMPANY, LIMITED, has been organized at Brandon, Manitoba, Canada, with a capital stock of \$300,000, to engage in the Hardware jobbing business. A building 80 x 100 ft. and five stories high has been erected, which will be used exclusively by the company. The incorporators are John Hanbury, John M. Brown, E. H. Johnston, G. R. Valdwel and A. E. Carmichael. The latter, who has been elected manager, was formerly associated with the Marshall-Wells Hardware Company, at Winnipeg.

THE HENKLE-JOYCE HARDWARE COMPANY, Lincoln, Neb., has been incorporated with a capital of \$250,000, of which \$175,000 is paid up, and will engage in the Hardware jobbing business. The wholesale department of the Lincoln Hardware Company has been taken over by the new company, the retail business of the latter having been sold to the Hardy Furniture Company. The incorporators are E. E. Henkle and R. M. Joyce.



Fig. 8.—A Type of the Operatives' Lavatories.

lavatories, which, however, are not accessible in working hours.

(To be Continued.)

TRADE ITEMS.

W. & J. TIEBOUT, 118 Chambers street, New York, manufacturers of and dealers in Brass, Galvanized and Ship Chandlery or Marine Hardware, are one of the oldest houses in this line in New York. The business, when established over 50 years ago, was first located on the East River, in the center of the shipbuilding industry, then one of the most important in the city. The



Fig. 9.—One of 10 Shower Baths.

purpose was to furnish a line of Hardware suitable for the wants of ship builders, there being no such source of supply then in existence in New York. The business has grown and expanded, but the lines of trade have not been deviated from. More recently there has been added a complete line of Hardware and Fittings required by motor boat and launch builders. The house carries a large and well assorted stock for immediate delivery, and

FIFTY YEARS OF HARDWARE ADVERTISING.

BY H. A. JOHNSON.

IN the Rome of the Caesars, when public announcement was needed or was necessary, criers patrolled the streets ringing huge bells and making their announcements at the top of their lungs. Such was the ancient and peripatetic method of advertising.

In early Massachusetts days a cow wandered aimlessly away, as effectively lost as only a cow may become. Its owner searched high and low for it, but in vain, and as a last resort he spoke of his loss to the owner of the local paper. The chat brought out a brilliant idea: Why not mention the fact in black-faced type that all might easily notice and therefore read of the lost cow, of course paying the paper's owner for the privilege? The bargain was quickly struck, and in consequence the weekly paper went to press with the first advertisement it had ever carried. It was the means of restoring the cow to its owner. This incident was the birth-fact from which sprang the advertising industry in the United States. By the same token this is the recorded case of the first satisfied advertiser.

Thus do we bridge the ages from times B. C. down to the eighteenth century. Let us draw nearer to the present, and applying our probe to the things of the world of metals, and therefore of greater importance to your readers, let us lay bare the advertising ideas and methods in vogue when *The Iron Age* was launched—half a century ago. Let us note the progress of advertising; let us see to what degree progress has obtained by comparing the present with the past.

CANDOR THE KEY NOTE.

One of the first things that impresses us as we look back over the advertising pages preserved in the premier volume of *The Iron Age* is the everywhere apparent candor of the individual advertisers. Where merchants had special goods to sell they used no worthless verbiage in conveying that impression. The announcements, whatever their nature, were strikingly plain and pointed. Moreover, their candor and frankness were couched in that good, old-fashioned phraseology, that careful, dignified, conservative English of the old school. Note the precision of the advertisement shown in Fig. 1.

THE NEW YORK KNIFE CO.,

Manufacturers of

Pen and Pocket Cutlery,

WALDEN, ORANGE CO., N. Y.,

RESPECTFULLY inform the Hardware Trade throughout the United States that they are still exclusively engaged in the manufacture of Pen and Pocket Cutlery, and—both as respects quality and price—are in a position to compete with any similar goods in the market, whether of American or British production.

Their facilities for producing Knives are such that they can execute the orders of their friends without disappointment or delay.

Goods delivered at Newburgh.

THOMAS J. BRADLEY, President.

Fig. 1.—An Ad from *The Iron Age* of the Early Sixties.

Though this savors of the time of the quill pen and sand that wrote and dried it, it is none the less genuine for a' that. In the light of nowadays it might be improved upon typographically, and much more alluring argument could be infused into it, yet it carries the conviction of honesty of purpose, and to my mind it is a long way ahead of many a Cutlery advertisement now appearing. In almost every piece of "copy" used in the days of '35 there is a very essential thing to be

seen: It is the honesty of diction, the utter lack of extravagance of expression. As a Simon-pure proof of this let me cite the case of one advertiser back in '37 who advertises the fact that he was "prepared to fill orders, if placed quickly, for all or part of a job lot of *second quality* Garden Spades." Would it not be rare to find such a public announcement as that nowadays? The old-time selling argument was presented briefly, perhaps



The Universal Clothes Wringer.

This Wringer has again taken the **FIRST PREMIUM** in the Great Fair of the American Institute—it has also taken the **FIRST PREMIUM** at the State Fairs of New York, Vermont, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Kentucky, Iowa, Wisconsin, Connecticut, River Valley Fair, Champlain Valley Fair, and at most of the County and Institute Fairs throughout the country. Over 200,000 have been sold, and are now in use in the United States, and we never heard of one that was not liked.

The **UNIVERSAL** is superior to all other Wringers, in having larger rolls of solid India Rubber, so protected by strong cog-wheels that they cannot slip or break loose from the shaft. Its strong wood frame cannot be broken, and does not rust or soil the clothes. Every Universal Wringer is **WARRANTED**.

We select a few testimonials from persons widely known to the public, who speak from actual experience, and are above suspicion of misstatement:

"My family would as soon give up the cooking-stove as this **CLOTHES WRINGER**. It cannot be too highly recommended."—**SOLOM ROBINSON**.

"After a constant use of the **UNIVERSAL CLOTHES WRINGER** for more than four years in my family, I am authorized by the 'powers that be' to give it the most unqualified praise, and to pronounce it an indispensable part of the machinery of housekeeping."—**REV. HENRY WARD BEECHER**.

"This is the first Wringer I have found that would stand the service required of it."—**J. F. HOGGINS, Lovejoy's Hotel**.

"We think the Machine much more than pays for itself every year in the saving of garments. We think it important that the Wringer be fitted with **rolls**."—**ORANGE JUDG, Editor American Agriculturist**.

"I heartily commend it to economists of time, money and contentment."—**REV. DR. BELLOW**.

"It saves labor, expedites work, and makes the laundry goodnatured, does not tear or buttons—and is indispensable in a well-regulated family."—**R. S. BROWN, Jr., D. D.**

A good canvasser can make money rapidly selling them in every town. Exclusive sale guaranteed and liberal terms given to responsible parties who first apply. Descriptive Circular and terms sent free.

The celebrated **DOITY'S CLOTHES WASHER**, which has just taken the **First Premium** at the great Fair of the American Institute, is sold also by the undersigned.

R. C. BROWNING, General Agent.
347 Broadway, New York.

Fig. 2.—An Illustrated Ad of 1865.

too much so, but it was tersely told. Flippancy, now very prevalent, was conspicuous by its absence. Although the wooden nutmeg seller, as well as the potato bug exterminator, was abroad in the land, his duplicity had not taken typed form, at least not in the old files that I have ransacked. And this honesty of design, so evident in the older advertising, was more than a surface indication of business ideas then current. The goods themselves were honest, as were the scales and measures by which they were sold. The short ton, the Troy ounce, the heavy scale pan, the shortened yard stick and various other schemes had not then appeared. To-day a Depart-

ment of Weights and Measures is a municipal necessity, and deputies are kept constantly busy correcting the standard of measurements that unscrupulous dealers in all lines of business have falsely set up.

ILLUSTRATIONS

It is interesting to observe the increasing use of advertising illustrations in going through the old files. In any issue of Vol. I there are very few cuts, but their increasing use keeps pace with the years. In the isolated cases where illustrations first appear they were crude wood cuts. Indeed, this method of picture reproduction was the sole method possible, for print paper in those days could have "carried" none other. But as time passed on and the papers came to be printed on heavier paper stock there is noticed the fact that the use of cuts became more general, and that the quality of illustration likewise increased in usefulness as in superiority. In fact, advertisers were only too quick to value the idea that the illustration was an essential detail of their announcements. Many cuts might better have been omitted, since they served no direct purpose and conveyed no necessary idea that would assist the advertisement to sell the goods. And by the same token many advertisements appear without a cut that would have been immeasurably strengthened had they been illustrated. Note the instance of a well placed illustration used in 1865, Fig. 2.

The present generation may be surprised to see that Clothes Wringers existed at that time, but that they did and that they were well advertised is a fact of which the above is proof. I would ask, too, that this cut be scrutinized carefully to note how much the above Wringer resembles the Clothes Wringers of 1905.

TYPE.

One of the striking oddities of the old files of *The Iron Age* is the type. Indeed, in no department of the printing art has greater change been wrought than in the detail of type. The old body type was cramped, stilted and

of appearance in the advertising columns really amounted to an advantage, since the paper itself was made to present a more uniform appearance. Odd as it may appear, the advertisement reproduced in Fig. 3 presents good type values.

TESTIMONIALS.

I am very much surprised to find in the old files the use, even though limited, of testimonials. This is nowadays known to be one of the strongest details an advertisement may possess, providing the testimonial be an honest one, written and given in the good faith of its signer. Thus I find that the personal word of one who used this or that commodity, who therefore knew its value and its true worth, was long ago regarded and recognized as having a potent influence in helping to sell more of its kind. The early use of the testimonial is proved by the advertisement, published in 1866, which is reproduced in Fig. 4.

Great improvement in Sewing Machines

EMPIRE SHUTTLE MACHINE!

Salesrooms, 536 Broadway, N. Y.,
250 WASHINGTON ST., BOSTON.



This Machine is constructed on entirely new principles of mechanism, possessing many rare and valuable improvements having been examined by the most profound experts, and pronounced to be SIMPLICITY and PERFECTION COMBINED.

It has a straight needle perpendicular action, makes the LOCK or SHUTTLE STITCH, which will NEITHER RIP nor RAVEL, and is alike on both sides, performs perfect sewing on every description of material, from Leather to the finest Nansook Muslin, with cotton, linen or silk thread, from the coarsest to the finest number.

Having neither CAM nor COG WHEEL, and the least possible friction, it runs as smooth as glass, and is

Emphatically a Noiseless Machine!

Agents Wanted for all towns in the United States where Agents are not already established. Also, for Cuba, Mexico, Central and South America, to whom a liberal discount will be given.

T. J. McARTHUR & CO.,
MANUFACTURERS AND PROPRIETORS,
536 Broadway, N. Y.

Fig. 3.—Another Ad of the Sixties, Illustrating the Modest Display Type of that Period.

consequently hard to read. The job (or display) type was condensed. The old advertisements all looked alike. Variance of composition was impossible, since so few styles of type were to be had. While this might be a disadvantage now it was not so in the fifties or sixties, because the demand for "artistic ads" had not then arisen. On the contrary, the call was for plain, simple advertisements, and to fulfill that purpose the old type was perfectly equal. As a literal matter of fact, this similarity

GAS SUPERSEDED!

PETROLEUM POPULARIZED!

Dissatisfied Gas Consumers,

AND THE PUBLIC GENERALLY, ARE INVITED TO SUBSTITUTE



and thus get a superior light for less money. It can be filled, trimmed and lighted (as quickly as gas) without removing the shade or chimney. We have an elegant variety of Chandeliers and Brackets, Hanging and Table Lamps, &c. Also, ATTACHMENTS for application to GAS FIXTURES and Table Lamps now in use. From many testimonials we select a few from this city:

From H. C. Bowen, Esq., of the Independent.
Since our gas-burners were removed and your lamps attached in their place, we get a brilliant yet mellow light, far superior to what we have "endured" heretofore. We have sixteen now in use, and all work well.

From Chas. Taylor, Esq., Pres. International Ins. Co.
I know it to be the best, and I think it is the most economical light I ever had.

From Brig.-Gen. Wm. Hall, No. 543 Broadway.
The light is the best I ever saw, and I think less expensive than gas. It is so well liked that we expect soon to adopt them throughout our factory.

From R. F. Mason, Esq., North American Fire Insurance Co.

I consider it the best light in use. It is steady, clear, and the most comfortable light to read or write by that I ever saw. I have renounced the gas, and shall use the Lamp till I find a better one.

Our Lamps are also used and approved by

The N. Y. Tribune,	Fowler & Wells,
J. M. Bradstreet & Son,	J. C. Derby, Esq.,
Theodore Tilton, Esq.,	Bowers, Beckman & Brad-
Morris, Wheeler & Co.,	ford, Jr.,
W. L. Cooper, Esq.,	Hugh Anchincloss, Esq.
Smith Clift, Esq.,	E. T. Brown & Co.,
J. H. Richards, Esq.,	"The Iron Age,"
Widows & Orphans Ins. Co.	Frank Leslie, Esq.,
D. W. Vaughan, Esq.,	Richard Brown, Esq.,
E. A. Stansbury, Esq.,	Lorillard Ins. Co.,
James Buell, Esq.,	Marvin & Co.,
Sargent & Co.,	John Anchincloss, Esq.,
Prof. D. G. Eaton,	Wm. B. Dala, Esq.,
Prof. C. H. Hitchcock,	H. W. Derby, Esq.,
J. E. Halsey & Co.,	N. Y. City Lunatic Asylum.

Call and examine or send for illustrated Circular.

JULIUS IVES & Co.,
No. 18 Beekman-st., N. Y.

Fig. 4.—A Testimonial Ad from *The Iron Age* of 1866.

Pretty good selling argument in that piece of copy, too.

NOVELTIES.

Still another peculiarity in the advertising columns of half a century ago is the lack of novelty subjects. Not until the eighties did hardware novelties begin to show in evidence. Generally speaking, then, novelties would seem to be an outcropping of the last two decades. There were novelties in that long ago, but an advertised novelty was indeed rare. And one need but go through the files of a few years to become amazed at their number, at the persistency with which they were advertised and at their mushroomlike growth. Many of them are still adver-

tised, having survived the test of time; inversely there are many more that have succumbed. Their usefulness was short lived and every Hardwareman cannot but be reminded of this fact when, taking his annual inventory, he finds many types of obsolete novelties on his top shelves and has to carry them forward on his sheets year after year without any changes whatever in the markings on the boxes that contain the one time novelties.

STAPLES AND NEW GOODS.

Comparing the advertised "styles" of staple goods of the Then and Now one is impressed with one forceful fact: how few changes 50 years have made in the outward form of Hardware staples. The material nowadays may be, and probably is, obtained by different processes, but that does not change the appearance. The Saw of 50 years ago is the same in looks as its counterpart of 1905. Tool parts and shapes may have changed, but the original tool is still apparent. Wire Nails have quite taken the place of Cut Nails, but the change is only a process of manufacture rather than a difference in the commodity. Many other illustrations might be cited, but they are needless. Being an amateur tool user I cannot refrain from writing the interest I feel in going through file after file of Hardware advertisements and in noting the announcements of new tools. The real progress of

He is dependent as well upon their prosperity as upon their caprice. He is in utter ignorance of the market where his goods are sold. He knows nothing of the price they bring. He is "patronized" by some large capitalist in Philadelphia, New York or Boston, and he must not, on pain of losing favor of his protectors, dare to hold intercourse with the parties who are dealing in his wares. The consequence is that if the jobber fails in business, if the trade is lessened by competition, or if they (the jobbers) find other and more popular or cheaper makers of the same goods, why then the poor, helpless manufacturer is cast loose without a customer. Thus by selling his goods through the medium of the jobbing houses he is not only compelled to sell at unduly depressed prices at the outset, but he is actually dependent upon their pleasure for the continuance of his market. . . . During the early struggles of the American manufacturers this state of things might and did exist, but now men of money are engaging in manufacturing enterprises, and they have need only to have their eyes opened to reject utterly the system of being held up by jobbers. . . . The agency idea proposes to bring the makers with prices and samples in fair competition with each other to every respectable buyer in the land. By this means the merchant acts intelligently, he does not buy his goods under misapprehension of



Fig. 5.—Reduced Reproduction of a Pistol Ad Forty Years Ago.

mankind finds a most potent expression here. One by one the new tools appear in advertised form. The period when the Ratchet Brace succeeded its loose grip prototype; of hand, breast and bench Drills; of delicate machinists' tools—of the thousand and one new things to make the tool user's task easier—must each and all have been gladly welcomed each in their time. Labor saving devices, tools and machinery have had no inconsiderable influence on the country's progress. Thus may the Hardwareman who has toiled and moiled for mere money feel a thrill of pride for having had a good part in the uplift of his country.

A REVERBERATION OF ANCIENT THUNDER.

Advertising and that alone is solely responsible for having broken one set of shackles as onerous as they were unfortunate. Half a century ago retailers sold goods that they knew not where they were made or by whom they were made. They bought their goods in simple faith from jobbers as they were forced to do. This prevented manufacturers from getting in any kind of touch with the retail trade, an omission by which all concerned suffered. In support of this statement I offer in evidence the following extract from "The Factor or Agency System," published in 1855 by the *Hardwareman's Newspaper*, the name under which *The Iron Age* was established and reprinted by *The Iron Age* September 27, 1896, because of the necessity at that time for some drastic action that would forever dissolve the bondage:

When a manufacturer restricts the sale of his goods only to two or three or a half dozen large wholesale houses, he renders himself entirely dependent upon them for a market for his wares.

their value or their origin, prices will abate and the entire world of Hardware be bettered.

Advertising abolished this thralldom. Quite true, and this was the method: About the time the above was published and in the resultant agitation, manufacturers everywhere seemed to rise in protest and in angered protest over the existing order of things. They would brook no temporizing with the pernicious conditions that had beset them. "The Factor or Agency System" if adopted could but work out part of their problem. Unitedly and alone they cast about for the solution, and finally the broad gauge weapon of advertising was placed in their hands by the spirit of progress. They availed themselves hungrily and fervidly of this opportunity. Advertising columns were most liberally used and a campaign of education was entered upon that sent terror to the jobbers' hearts and in the end brought the long looked for freedom. To-day we find that the manufacturer is supreme. The old time jobber has passed into innocuous desuetude; into a grave that his own avarice dug for him. Jobbers there are to-day, as jobbers there always will be, but their wings no longer have the power of their confrères of 50 years ago, while the retailer of to-day may have full information and free co-operation from the manufacturer. Indeed, this very co-operation expresses itself again in terms of advertising. The manufacturer who furnishes dealers with advertising matter is on the royal road, and the avidity with which retailers accept this aid bespeaks the sterling value of the policy.

TO SUM UP BRIEFLY.

Everything is in a process of evolution and Hardware advertising has been no exception to the rule. In

early days an advertiser caused a "card" to be inserted in a paper, this card announcing his name, his location and the goods he offered for sale. In those days publications carried but little advertising and so it is reasonable to suppose that this card was profitable. Where these methods were crude, experience has been a lighted torch to guide the tremulous advertisers to the firm footing of the present. Advertising has passed through its evolution. It has kept abreast of the times.

In proportion as advertising has been increased in quality advertisers have had to make their copy better, in order to keep step with the other paraders. The great signs of progress are easily explained. Those advertisers have shown the most marked increase in business whose advertising has been the most explicit, who have told the full story of their goods (so that a reader might glean an instant and accurate mental picture of the article advertised), who have followed up their advertising with generous treatment and whose advertisements have been honest. In the hands of such men type has been made to serve because it was made to say the essential things, because it was forced to create a buying desire. To illustrate this, note the force, the positive selling force, the desire-creating pith of some of the announcements of Revolver manufacturers of to-day. Compare them with the copy used in 1865 for the Marston Patent Repeater, Fig. 5.

Of course I grant that there is more to advertise in the 1906 copy than in that of 1865. Firearms have passed through their evolution, too, and the finished firearm of to-day warrants better advertising. But I cite these cases more as illustrating the profound principle of progress. Taken all in all, advertising has been but one step in business betterment. The merit of goods is easily seen to be factor No. 1; individuality of the firm is No. 2; advertising is No. 3; methods of dealing with customers is No. 4. These factors normally are mutually interdependent, as fountain to stream, root to tree or seed to fruit. They have amassed fortunes and built up the business characters that are Gibraltars of power. They are monuments of honesty. The methods used by advertisers fifty years ago were in strict keeping with their progress in all other lines. It was the creeping stage of business development. After they had learned to creep they walked boldly and alone.

How well they learned their lesson, how sturdy their legs became, is best proven by the Hardware advertising of to-day. Collectively group the advertising of Hardware and its allied subjects—in short, the metal world—and we find that in volume and in character this advertising surpasses in quality as it does in quantity the advertising of any other grade of merchandise.

FORCE PUMPS FOR THE FARMER.

IN a circular letter recently sent out to their traveling representatives, F. E. Myers & Bro., Ashland, Ohio, manufacturers of Pumps, Hay Tools, &c., called attention among other matters to the question of fire protection for the farmer, and in this connection the point was made that with an efficient double acting Force Pump and a few hundred feet of Hose the farmer could successfully cope with fire, should it occur, and while protecting him against damage by fire this sort of Pump also enabled him to enjoy other advantages. Water may be forced through the Hose into his barn to wash out stalls and clean Wagons and Buggies; he may wash windows, walks, porches, &c., water the lawn and even irrigate the land. The presence of a double acting Force Pump on the farm was also referred to as furnishing an argument for the soil tiller in demanding a reduction of his insurance rate.

All this enforces the opportunity there is for Hardware merchants not now pushing the sale of Pumps to take up a line which with a little enterprise and energy can be made to yield a good profit for the time and labor expended in exploiting it. In addition, the sale of Pumps generates a demand for Valves, Fittings, Pipe, Tools, Hose and many other items which Hardwaremen generally should supply and thereby divert such of this trade

as is going to the catalogue houses. Merchants who are giving intelligent attention to the marketing of Pumps and accessories are more than pleased with the results of their enterprise and consider it one of their most profitable lines and a winner of trade in other directions.

Display Hook.

Sargent & Co., New Haven, Conn., and 149-153 Leonard street, New York, have just brought out the display hook, here illustrated. It is designed partly for supporting glass shelves in showcases, &c., steel goods or such articles as may suggest themselves in Hardware and kindred establishments. The material is cast iron, in 8 and 9-in. sizes, finished as follows: Japanned, bronze plated,



Display Hook.

antique copper, bronze plated, highly polished and antique copper highly polished. All are packed with screws to match except the japanned hooks, which are sold without screws.

Nodenta Cuspidor.

Freeport Novelty Company, Freeport, Ill., is manufacturing a new line of cuspidors, one of which is reproduced herewith. They are cast in one piece, waist shape, and are described as made of a special process metal of great hardness and toughness which will withstand the severest usage. It is further asserted that they cannot be dented by any kick or blow, or broken by any weight



Nodenta Cuspidor.

which is likely to be put upon them. A feature of these cuspidors is a solid rubber tire on the bottom which prevents them from making a noise or scarring hardwood, tile or marble floors. They are enameled on the inside, so that they may be easily and thoroughly cleaned, and the outside is finished in a rich gold color which, it is declared, will wear indefinitely without losing its luster. They are made in a number of sizes and shapes, and are especially designed for hotels, bars, lobbies, corridors, offices, &c.

THE KRAMER BROTHERS FOUNDRY COMPANY, Dayton, Ohio, manufacturer of Hardware Specialties and Stove Repairs, has enlarged its plant so as to be in a position to take care of a larger business during 1907. The company was obliged to turn down a number of orders during the past year. A new 36-page catalogue of Cement Tools, and also a supplement to the company's Vase catalogue are now in the hands of the printer and will shortly be issued. The company has arranged for its representation by E. V. Gilbert in the States of Ohio, Indiana and Michigan during the coming year.

The Little Giant Adjustable Tap and Reamer Wrench.

In Fig. 1 of the accompanying cuts is shown an adjustable tap and reamer wrench offered by Wells Bros.



Fig. 1.—The Little Giant Adjustable Tap and Reamer Wrench.

Company, Greenfield, Mass., New York office 56 Reade street. The wrench is drop forged, with flat tool steel jaws which fit exactly in their position in the wrench, opening and closing automatically when the handles are turned. It is explained that it is unnecessary to unscrew the handles and then push or pound the loose jaw back. The wrench is now being furnished in one of the screw



Fig. 2.—Screw Plates with Which Tap and Reamer Wrench Is Furnished.

plates shown in Fig. 2, without increasing the cost of the plate. Previously the company had included a good but much cheaper wrench in the screw plate.

The Turner Alcohol Blow Pipe No. 100.

The double jet alcohol blow pipe made by Turner Brass Works, Chicago, is illustrated herewith. The double jet construction of the burner generates the maximum degree of heat from the fuel over 3000 degrees F. It burns wood alcohol and produces a needle pointed flame which the maker states is excellent for all kinds

of fine soldering such as is done by jewelers, opticians, dentists and electricians. The flame is said to be perfectly clean and nonoxydizing and is especially recommended for storage battery, lead burning and similar work. The burner is swiveled so that it can be turned



Turner Alcohol Blow Pipe No. 100.

weight, 2½ lb. Its capacity is 1 pint and its consumption ¼ pint per hour.

The Tallahassee Hardware Company, Tallahassee, Fla., has been incorporated with a capital of \$10,000. Thos. H. Lloyd has been elected president and T. H. Bond, secretary and treasurer.

PAINTS, OILS AND COLORS

Animal, Fish and Vegetable Oils—

Linseed, City, raw.....	42 @43
City, Boiled.....	43 @44
State and Western, raw.....	41 @42
Raw Calcutta, in bbls.....	70 @
Lard, Extra Prime, Winter.....	77 @78
Extra No. 1.....	50 @51
No. 1.....	44 @45
Cotton-seed, Crude, f.o.b. mills.....	@
Summer Yellow, Prime.....	42 @43 1/2
Summer White.....	40 @
Sperm, Crude.....	52 @53
Natural Winter.....	65 @66
Bleached Winter.....	68 @69
Bleached Winter, Extra.....	70 @71
Tallow, Prime.....	55 @56
Whale, Crude.....	35 @36
Natural Winter.....	45 @46
Bleached Winter.....	47 @48
Extra Bleached Winter.....	49 @50
Menhaden, Brown, Strained.....	29 @32
Light, Strained.....	29 @32
Northern.....	28 @
Southern.....	27 @
Cocanut, Ceylon.....	7 b 8 1/2 @ 8 1/2
Cochin.....	7 b 9 1/2 @
Cod, Domestic, Prime.....	30 @35
Newfoundland.....	34 1/2 @42
Red, Elaine.....	45 @48
Saponified.....	7 b 6 @ 6 1/2
Olive, Italian, bbls.....	6 @6
Neatsfoot, Prime.....	49 @50
Palm, Logos.....	7 b 7 @ 7 1/4

Mineral Oils—

Black, 2 gravity, 2500 cold test.....	10 1/2 @11 1/4
2 gravity, 15 cold test.....	17 1/2 @17 3/4
Summer.....	10 1/2 @11 1/4
Cylinder, light filtered.....	18 @19
Dark, filtered.....	16 @17
Paraffine, 903-907 gravity.....	13 1/4 @14
903 gravity.....	17 1/2 @18 1/2
905 gravity.....	10 1/4 @10 3/4
Red.....	12 1/2 @14

Miscellaneous—

Barytes:	
White, Foreign.....	7 ton \$18.50 @20.00
Amer. floated.....	7 ton 10.00 @
Off color.....	7 ton 11.50 @15.50
Chalk, in bulk.....	7 ton 3.00 @ 3.25
In bbls.....	100 lb @ .35
China Clay, English.....	7 ton 11.00 @17.00
Cobalt, Oxide.....	100 lb 1.50 @ 2.00
Whiting, Commercial.....	100 lb .43 @52
Gilders.....	100 lb .50 @ .55
Ex. Gilders.....	100 lb .55 @ .60
Putty, Commercial.....	100 lb @
In bladders.....	\$1.70 @1.85
In bbls, or tubs.....	1.20 @1.40
In 1 lb to 5 lb cans.....	2.45 @2.95
In 12 1/2 to 50 lb cans.....	1.80 @1.90
Spirits Turpentine.....	7 gal.
In Oil bbls.....	70 @70 1/2
In machine bbls.....	70 @71
Glue—	
Cabinet.....	11 lb @15
Common Bone.....	1 @ 9
Extra White.....	10 @24
Foot Stock, White.....	11 @14
Foot Stock, Brown.....	8 @11
German Hide.....	12 @
French.....	10 @
Irish.....	13 @16
Low Grade.....	9 @12
Medium White.....	14 @17
Gum Shellac—	
Bleached Commercial.....	47 @48
Bones, Dried.....	57 @58
Buttton.....	40 @50
Diamond.....	35 @
Fine Orange.....	52 @55
A. C. Garnet.....	47 @49
Kala Button.....	37 @38
G. A. L. Garnet.....	45 @45 1/2
D. C.....	59 @60
Octagon B.....	64 @
T. N.....	40 @49
V. S. O.....	40 @
Colors in Oil—	
Black, Lampblack.....	12 @14
Blue, Chinese.....	35 @36
Blue, Prussian.....	32 @34

Blue, Ultramarine.....	13 @16
Brown, Vandyke.....	11 @16
Green, Chrome.....	12 @16
Green, Paris.....	12 @21
Sienna, Raw.....	12 @15
Sienna, Burnt.....	12 @15
Umber, Raw.....	11 @14
Umber, Burnt.....	11 @14

White Lead, Zinc, &c.—

Lead, American White:	
Lots of 500 lb or over, in Oil ..	@ 7
Lots less than 500 lb, in Oil, ..	@ 7 1/2
Dry in Barrels.....	@ 6 1/2
Lead, English white, in Oil.....	@ 10
Lead, White, in oil, 25 lb tin	
pails, add to keg price.....	@ 1 1/4
Lead, White, in oil, 1 to 5 lb	
pails, add to keg price.....	@ 1
Lead, White, in oil, 1 to 5 lb	
as-ted tins, add to keg price ..	@ 1 1/4
Lead, American, Terms: For lots 12	
tons and over 1/4¢ rebate; and 2% for	
cash if paid in 15 days from date of	
invoice; for lots of 500 lbs. and over	
2% for cash if paid in 15 days from	
date of invoice, for lots of less than	
500 lbs. net.....	@ 5
Zinc, American, dry.....	5 1/2 @ 5 1/2
Zinc, French:	
Antwerp, Red Seal, dry.....	8 1/2
Antwerp, Green Seal, dry.....	10 1/2
Paris, Red Seal, dry.....	9 1/4
Paris, Green Seal, dry.....	11
Zinc, V. M. French, in Poppy Oil:	
Green Seal:	
Lots of 1 ton and over.....	13 1/4 @13 1/2
Lots of less than 1 ton.....	13 1/2 @13 3/4
Zinc, V. M. French, in Poppy Oil:	
Red Seal:	
Lots of 1 ton and over.....	11 1/4 @12 1/4
Lots of less than 1 ton.....	12 1/4 @12 3/4
Discounts—French Zinc—Discounts	
to buyers of 10 bbl, lots of one or mixed	
grades, 1%: 25 bbls., 2%: 50 bbls., 4%:	
Dry Colors—	
Black, Carbon.....	6 1/2 @11
Black Drop, American.....	4 @ 6
Black Drop, English.....	5 @15

Black, Ivory.....	16 @20
Lamp, Com.....	4 @ 6
Blue, Celestial.....	4 @ 6
Blue, Chinese.....	29 @32
Blue, Prussian.....	27 @30
Blue, Ultramarine.....	4 1/4 @15
Brown, Spanish.....	1 1/2 @ 1
Carmine, No. 40.....	\$3.00 @3.25
Green, Chrome, ordinary.....	3 1/2 @ 6
Green, Chrome, pure.....	17 @25
Lead, Red, bbls., 1/2 bbls. and kegs:	
Lots 500 lb or over.....	@ 7 1/4
Lots less than 500 lb.....	@ 7 1/2
Litharge, American, bbls.....	7 1/4 @ 7 1/2
Ocher, American.....	7 ton \$8.50 @16.00
American Golden.....	2 1/4 @ 3 1/4
French.....	1 1/4 @ 2
Foreign Golden.....	3 @ 4
Orange Mineral, English.....	10 @12
French.....	10 1/2 @12
German.....	8 1/2 @10
American.....	8 1/4 @ 8 1/2
Red, Indian, English.....	4 1/2 @ 5 1/2
American.....	3 @ 3 1/2
Red, Turkey, English.....	4 @10
Red, Tuscan, English.....	7 @10
Red, Venetian, Amer.....	100 lb \$2.50 @2.25
English.....	100 lb \$1.50 @1.75
Sienna, Italian, Burnt and	
Powdered.....	3 @ 9 1/4
Italian, Raw, Powdered.....	3 @ 9 1/4
American, Raw.....	1 1/4 @ 2
American Burnt and Pow'd.....	1 1/4 @ 2
Talc, French.....	7 ton \$17.00 @25.00
Terra Alba, French.....	100 lb .50 @ 1.00
English.....	100 lb .50 @ 1.00
American.....	100 lb .50 @ 1.00
American.....	100 lb .50 @ 1.00
Umber, Tkey, Bnt. & Pow'd.....	2 1/4 @ 3 1/4
Turkey, Raw and Powdered.....	2 1/4 @ 3 1/4
Burnt, American.....	1 1/4 @ 2
Raw, American.....	1 1/4 @ 2
Yellow Chrome.....	12 @14
Vermilion, American Lead.....	10 @
Quicksilver, bulk.....	6 @
Quicksilver, bases.....	6 @
English, Imported.....	6 @ 7 1/2
Chinese.....	\$2.50 @1.00

Current Hardware Prices.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer—are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33% @ 33% & 10% signifies

that the price of the goods in question ranges from 33% per cent. discount to 33% and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued May, 1906, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Adjusters, Blind—

Domestic, $\frac{1}{2}$ doz. \$3.00.....33%
North's.....10%
Zimmerman's—See Fasteners, Blind.

Window Stop—

Ives' Patent.....35%
Taplin's Perfection.....35%

Ammunition—See Caps, Cartridges, Shells, &c.

Anti-Rattlers—

Fernald Mfg. Co. Burton Anti-Rattlers, $\frac{1}{2}$ doz. pairs, Nos. 1, \$0.75; 2, \$0.60; 4, \$1.00; 5, \$0.50.
Fernald Quick Shifter, $\frac{1}{2}$ doz. pairs.....\$2.00@3.00

Anvils—American—

Eagle Anvils..... $\frac{1}{2}$ lb. @ 8%
Hay-Budden, Wrought..... $\frac{1}{2}$ lb. @ 9%
Trenton..... $\frac{1}{2}$ lb. @ 9%

Imported—

Peter Wright & Sons, $\frac{1}{2}$ lb. 94 to 340 lb. 116; 350 to 600 lb. 114%
Anvil, Vise and Drill—
Millers Falls Co., \$18.00.....15-10%

Apple Parers—See Parers, Apple, &c.

Aprons, Blacksmiths—

Livingston Nail Co.....33-14%

Augers and Bits—

Com. Double Spur.....75@75-10%
Jennings' Patn., reg. Anvil.....60-5@60-10%

Black Lip or Blued—

Boring Aug. Augers.....70-10%
Car Bits, 12-in. twist.....10-10%
Ford's Auger and Car Bits.....40-5%
Fr. Washington Auger Co., Conard's.....35%

Forster's Auger Bits—

C. E. Jennings & Co.:
No. 10 ext. lip, R. Jennings' list.....35%
No. 30, R. Jennings' list.....35-10%

Russell Jennings—

L'Hommedieu Car Bits.....45%
Mayhew's Countersink Bits.....45%
Pugh's Black.....30-10%
Pugh's Jennings' Pattern.....30-10%

Snell's Auger Bits—

Snell's Bell Hangers' Bits.....60%
Snell's Car Bits, 12-in. twist.....60%
Snell's King Auger Bits.....60%
Wright's Jennings Bits.....60%

Bit Stock Drills—

See Drills, Twist.
Expansive Bits—
Clark's small, \$18; large.....60-10%
Clark's Pattern, No. 1, $\frac{1}{2}$ doz. \$38;
No. 2, \$18.....60-10-10%

Ford's, Clark's Pattern—

C. E. Jennings & Co., Steer's Pat. 25%
Lavigne Pat., small size, \$18.00; large size, \$26.00.....70-10%
Swan's.....60%

Gimlet Bits—

Common Dble. Cut.....\$3.00@3.25
German Pattern, Nos. 1 to 10, \$4.75; 11 to 13, \$5.75

Hollow Augers—

Bonney Pat., per doz. \$3.50@6.00
Ames.....35-10%
Universal.....30%
Wood's Universal.....30%

Ship Augers and Bits—

Ship Augers.....\$5-10%
Ford's.....35-10%
C. E. Jennings & Co.:
L'Hommedieu's.....15%
Watrous.....35-10%
Snell's.....60%

Awl Hafts—See Handies, Mechanics' Tool.

Awls—

Brad Awls:
Handled.....gro. \$2.75@3.00
Unhanded, Blistered.....gro. \$2.00@2.50
Unhanded, Patent.....gro. \$2.00@2.50

Peg Awls—

Unhanded, Patent.....gro. \$1.00@1.50
Unhanded, Blistered.....gro. \$1.00@1.50
Scratch Awls:
Handled, Com.....gro. \$1.00@1.50
Handled, Socket.....gro. \$1.00@1.50

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

Single Bit, base weights: Per doz.
First Quality.....\$1.75@2.00
Second Quality.....\$1.50@1.75
Double Bit, base weights:
First Quality.....\$7.00@7.50
Second Quality.....\$6.50@7.00

Axle Grease—

See Grease, Axle

Axles—Iron or Steel

Concord, Loose Collar.....45@50%
Concord, Solid Collar.....45@50%
No. 1 Common, Loose.....35@40%
No. 1 1/2 Com., New Styles.....44-5%
No. 2 Solid Collar.....35@40%
Half Patent.....

Nos. 7, 8, 11 and 12.....70@75%
Nos. 13 to 14.....70@75%
Nos. 15 to 18.....75@75-5%
Nos. 19 to 22.....75@75-5%

Boxes, Axle—

Common and Concord, not turned lb., 45@50%
Common and Concord, turned lb., 55@60%
Half Patent.....lb., 95@100%

Bait—Fishing—

Hendryx:
A Bait.....30%
B Bait.....30%
Competition Bait.....30-5%

Balances—Sash—

Caldwell new list.....50%
Pullman.....50-10@60%

Spring—

Spring Balances.....50-10@60%
Chattillon's:
Light Egg Balances.....50-10%
Straight Balances.....40-50%
Circular Balances.....50-10%
Large Dial.....30%

Barb Wire—See Wire, Barb.

Bars—Crow—

Steel Crowbars, 10 to 40 lb. per lb., 3@3-1/2%

Towel

No. 10 Ideal, Nickel Plate..... $\frac{1}{2}$ gro. \$0.50

Beams, Scale—

Scale Beams.....40%
Chattillon's No. 1.....30%
Chattillon's No. 2.....40%

Beaters, Carpet—

Holt-Lyon Co.:
No. 12 Wire Coppered $\frac{1}{2}$ doz. \$0.80;
Tinned.....70-10%
No. 11 Wire Coppered $\frac{1}{2}$ doz. \$1.15;
Tinned.....\$1.20
No. 10 Wire Tinned..... $\frac{1}{2}$ doz. \$1.50
Western W. G. Co.:
No. 1 Electric..... $\frac{1}{2}$ gro. \$7.00
No. 2 Buffalo..... $\frac{1}{2}$ gro. \$9.00
No. 3 Perfection Dust..... $\frac{1}{2}$ gro. \$8.00

Egg—

Holt-Lyon Co.:
Holt, per doz. No. 5, Jap'd. \$0.80;
No. A, Jap'd. \$1.15; No. B, Jap'd. \$1.65; No. 6, Jap'd. \$1.65.
Lyon, Jap'd. per doz. No. 2, \$1.35.

Taplin Mfg. Co.: Improved Dover, per gro. No. 60, \$4.00; No. 75, \$4.50; No. 100, \$7.00; No. 102, Tin'd. \$8.50; No. 150, Hotel, \$15.00; No. 152, Hotel Tin'd. \$17.00; No. 200, Tumbler, \$8.50; No. 202, Tumbler Tin'd. \$9.50; No. 300, Mammoth, per doz., \$25.00.

Turner & Seymour Mfg. Co.:
T. & S. Dorer.....\$6.00
Western W. G. Co. $\frac{1}{2}$ gro. Buffalo, No. 2, \$8.00; Perfection, No. 3, \$9.00.
Wonder (R. M. Co.) $\frac{1}{2}$ gro. net, \$6.25

Bellows—

Blacksmith, Standard List..
Split Leather.....65%
Grain Leather.....60%

Hand—

Inch. 6 7 8 9 10
Doz. \$5.50 6.15 6.60 7.15 7.70

Molders—

Inch. 9 10 11 12 14
Doz. \$8.00 9.00 10.50 12.50 14.50

Bells—Cow—

Ordinary Goods.....75-50@75-10-5%
High grade.....70-10@75%
Jersey.....75-10%
Texas Star.....50%

Door—

Abbe's Gong.....45%
Barton Gong.....50%
Home B. & M. Mfg. Co.'s.....60-10%
Trip Gong.....50-10@50-10-5%
Yankee Gong.....50%

Hand—

Polished, Brass.....60@60-5%
White Metal.....50-10@50-10-5%
Nickel Plated.....50@50-10%

Sticks.....50-10@50-10-5%
Cous's Globe Hand.....33-10@35%
Silver Chime.....35-10@35%

Miscellaneous—

Farm Bells.....lb., 2 1/2 @ 2 1/2%
Church and School.....60%
Fable Call Bells.....50@50-10-10%

Belting—Leather—

Extra Heavy, Short Lap.....60-5%
Regular Short Lap.....60-10-5%
Standard.....70%
Light Standard.....70-5%
Cut Leather Lacing.....45%
Leather Lacing Sides, per sq. ft. 25%

Rubber—

Agricultural (Low Grade).....75@75-5%
Common Standard.....70@70-10%
Standard.....60-5@60-10%
Extra.....60-10@60-5%
High Grade.....50-5@50-10%

Bench Stops—

See Stops, Bench

Benders and Upsetters, Tire—

Detroit Perfected Tire Bender.....40%
Detroit Standard's Lightning Tire Upsetters, No. 1, \$4.25; No. 2, \$7.25; No. 3, \$10.50; No. 4, \$16.25; No. 5, \$20.50.
Green River Tire Benders and Upsetters.....30%

Bicycle Goods—

John S. Leng's Son & Co.'s 1906 list:
Chain, Parts, Spokes.....50%
Tubes.....60%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See Augers and Bits.

Blocks—Tackle—

Common Wooden.....75%
Hartz St. Tackle Blocks.....50@50-5%
B. & L. B. Co.:
Boston Wood Snatch, 50%; Ellipse Steel, 75%; Hollow Steel, 50-10%; Star Wire Rope, 50%; Tarbox Metal Snatch, 50%; Tarbox New Style Steel, 50-10%; Wire Rope Snatch, 50%; Lane's Patent Automatic Lock and Junior.....30%
Stowell's Novelty, Mal. Iron.....50%
Stowell's Loading.....50-10%
See also Machines, Hoisting.

Boards, Stove—

Zinc, Crystal, &c.....40%
Paper Embossed.....40-10%

Boards, Wash—

See Washboards.

Bobs, Plumb—

Keuffel & Esser Co.....25-10%

Boils—

Carriage, Machine, &c.—
Common Carriage (cut thread):
% X 6 and smaller 70-10-5%
Larger and Longer 60-5@60-10%
Phila. Eagle \$1.00 list May 24, '99

Boil Ends—

Machine, $\frac{1}{2}$ & 4 and smaller.....70-12 1/2 @ 70-10%
Machine, larger and 1 longer.....60-5@70-10%

Door and Shutter—

Cast Iron Barrel, Japanned, Round Brass Knob:
Inch.....5 6 8
Per doz. \$1.30 35 45 60 80

Cast Iron Spring Foot, Jap'd:

Inch.....8 10
Per doz.....\$1.20 1.50 2.25

Cast Iron Chain, Flat Japanned:

Inch.....6 8 10
Per doz.....\$1.00 1.40 1.85

Cast Iron Flat Shutter, Jap'd:

Brass Knobs:
Inch.....6 8 10
Per doz.....\$0.75 35 1.25

Wrought Barrel Jap'd. 80@80-10%

Barrel Bronzed.....60-10%
Spring.....70-10@70-10-5%
Shutter.....50-5@50-10-5%
Square Neck.....75@75-10%
Square.....70-10@70-10%

Ives' Patent Door—

50%

Plow and Stove—

Plow.....65-10@—%
Stove.....85-10%

Tire—

Common Iron.....80%
Norway Iron.....80%
American Screw Company:
Norway Phila., list Oct. 16, '91.....80%
Eagle Phila., list Oct. 16, '91.....82-5%
Bay State, list Dec. 28, '99.....80%

Franklin Moore Co.: Norway Phila., list Oct. 16, '91.....80%

Eagle Phila., list Oct. 16, '91.....82-5%
Eclipse, list Dec. 28, '99.....80%
Mount Carmel Bolt Co.:
Norway Phila., list Oct. 16, '91.....80%
Eagle Phila., list Oct. 16, '91.....82-5%
Mount Carmel, list Dec. 28, '99.....80%

Russell, Burdall & Ward Bolt & Nut Co.:
Empire, list Dec. 28, '99.....80%
Norway Phila., list Oct., '94.....80%

Upson Nut Co.: Tire Bolts.....72-14%

See Bolts.....72-14%

Borers, Tap—

Borers Tap, Ring, with Handle:
Inch.....1 1/4 1 3/4 2
Per doz.....\$1.80 5.60 6.40 8.00

Boxes, Mite—

C. E. Jennings & Co.....30%
Langdon, New Langdon and Langdon Improved, 25-10%; Langdon Acme.....15-10%
Perfection.....40%
Seavey B. & L. Co.: Nos. 28 to 400, 30%; Nos. 50 and 60.....35%

Braces—

Common Ball, American, \$1.25@1.50
Barber's.....50-10@100-10%
Fray's Genuine Spoford's.....60%
Fray's No. 70 to 120, 81 to 120, 207 to 411.....60%
C. E. Jennings & Co.....60-5%
Mayhew's Ratchet.....60%
Mayhew's Quick Action Hay Pat.....50%
Millers Falls Drill Braces.....50-10%
P. S. & W. Co., Peck's Pat. 60-5@60-10%
Stanley B. & L. Co.:
Stanley, 35%; Victor.....45%

Brackets—

Wrought Steel.....30@30-5%
Griffin's Pressed Steel.....75-10@80%
Griffin's Folding Brackets.....70-10%
Stowell's Cast Shelf, 75%; Sink, 50%
Western W. G. Co. Wire.....60-10%

Bright Wire Goods—

See Wire and Wire Goods.

Broilers—

Kilbourne Mfg. Co.....75-20%
Western W. G. Co.....80%
Wire Goods Co.....75@75-10%

Buckets, Galvanized—

M'Fg's list, price per gross:
Quart. 10 12 14
Water, Reg. 25.35 28.00 32.00
Water, Hvy. 45.35 48.00 52.00
Fire, Rd. Rim 32.00 34.65 38.65
Well.....37.35 41.35 45.35

Bucks, Saw—

Hoosier.....\$5 gro. \$26.00

Bull Rings—See Rings, Bull

Butts—Brass—

Wrought, High List, Oct. 26, '06.
Cast Brass, Tiebout's.....50%
Cast Brass, Tiebout's.....60%

Cast Iron—

Fast Joint, Broad.....40-10@50%
Fast Joint, Narrow.....40-10@50%
Loose Joint.....70-10@75%
Loose Pin.....70-10@75%
Mayer's Hinges.....70-10@75%
Parliament Butts.....70-10@75%

Wrought Steel—

Reversible and Broad.....75%
Light Reversible, Light Narrow.....75%
Loose Joint, Narrow, L.H. Inside Blind, etc. 70-10%
Back Flaps, Table.....70%

Cages, Bird—

Hendryx Brass: Series 3000, 5000, 1100, 19%; 1200, 25%; 200, 300, 600, 300
Hendryx Bronze, Series 700, 800, 40%
Hendryx Enameled.....40%

Calipers—See Compasses.**Calks, Toe and Heel—**

Blunt, 1 prong... per lb., 45¢
 Sharp, 1 prong... per lb., 45¢
 Burke's Blunt, 4¢; Sharp, 4¢
 Gautier, Blunt, 4¢; Sharp, 4¢
 Perkins, Blunt, 4¢; Sharp, 4¢

Can Openers—

See Openers, Can.

Cans, Milk—

Illinois Pattern... 1.35 1.55 2.05 each.
 New York Pattern... 1.50 2.20 2.45 each.
 Baltimore Pattern... 1.50 2.20 2.45 each.
 Dubuque... 1.35 1.60 1.75 each.

Cans, Oil—

Buffalo Family Oil Cans:
 5 10 gal.
 \$12.00 60.00 120.00 gro., net.

Caps, Percussion—

Eley's E. B. ... 60¢
 G. D. ... per M 34¢
 F. L. ... per M 40¢
 G. E. ... per M 40¢
 Musket ... per M 60¢

Primers—

Berdan Primers, 2¢ per M. 20¢
 Primer Shells and Bullets. 15¢
 All other primers per M. \$1.52 @ 1.60

Cartridges—

Blank Cartridges:
 32 C. F. \$5.50 10.65
 32 C. F. \$7.00 10.65
 25 cal. Rim. \$1.50 10.65
 32 cal. Rim. \$2.75 10.65
 B. B. Caps, Con. Ball, S&W. \$1.00
 B. B. Caps, Round Ball. \$1.40
 Central Fire. 25¢
 Target and Sporting Rifle. 15¢
 Primed Shells and Bullets. 15¢
 Rim Fire, Sporting. 50¢
 Rim Fire, Military. 15¢

Castors—

Bed ... 70¢
 Plate ... 60¢
 Philadelphia ... 75¢
 Acme Ball Bearing ... 33¢
 Boss ... 70¢
 Boss Anti-Friction ... 70¢
 Gm (Roller Bearing) ... 50¢
 Martin's Patent (Phoenix) ... 45¢
 Standard Ball Bearing ... 45¢
 Tucker's Patent low list ... 30¢
 Yale (Double Wheel) low list ... 50¢

Cattle Leaders—

See Leaders, Cattle.

Chain, Coil—

American Coil, Straight Link:
 5-16 3-16 5-16 3-16 7-16 3-16 9-16
 \$9.15 6.30 5.25 4.35 4.15 4.10
 1/2 1/2 1/2 to 1-16 1/2 to 1-1/4 inch.
 \$4.00 3.50 3.65 3.95
 German Coil ... 60¢

Halter—

Halter Chains ... 60¢
 German Pattern Halter Chains ... 60¢
 List July 24, '97 ... 60¢
 Covert Mfg. Co. ... 34¢

Cow Ties—

See Halters and Ties.

Trace, Wagon, &c.—

Traces, Western Standard: 100 pr.
 6-1/2-6-3, Straight, with ring, \$27.00
 6-1/2-6-2, Straight, with ring, \$23.00
 6-1/2-8-2, Straight, with ring, \$32.00
 6-1/2-10-2, Straight, with ring, \$37.00

NOTE—Add 2¢ per pair for Hooks.
 Twist Traces: add per pair for Nos. 2 and 3, 2¢; No. 1, 3¢; No. 4, 4¢ to price of Straight Link.

Eastern Standard Traces, Wag-
 on Chain, &c. ... 60¢

Miscellaneous—

Jack Chain, list July 10, '93:
 Iron ... 60¢
 Brass ... 60¢
 Safety and Plumbers' Chain, 70¢
 Gal. rump Chain ... 40¢
 Covert Mfg. Co.:
 Breast, Halter, Heel, Rein, Stal-
 lion ... 40¢
 Oneida Community:
 Am. Dog Leads and Kennel Chains ... 40¢
 Niagara Dog Leads and Kennel
 Chains ... 40¢
 Wire Goods Co.:
 Dog Chain ... 70¢
 Universal Dbl.-Jointed Chain ... 60¢

Chain and Ribbon, Sash—

Oneida Community:
 Copper Chain, 60¢; Steel Chain, 60¢
 Pullman:
 Bronze Chain, 60¢; Steel Chain, 60¢
 Sash Chain Attachments, per set, 8¢
 Aluminum Sash Ribbon, per 100
 ft. ... \$1.25
 Sash Ribbon Attachments, per set, 8¢

Chalk—(From Jobbers.)

Carpenters' Blue ... 50¢
 Carpenters' Red ... 45¢
 Carpenters' White ... 40¢

Checks, Door—

Bardsley's ... 45¢
 Pullman, per gro. ... 54.00
 Russell ... 39¢

Chests, Tool—

American Tool Chest Co.:
 Boys' Chests, with Tools ... 35¢
 Youths' Chests, with Tools ... 40¢
 Gentlemen's Chests, with Tools ... 30¢
 Farmers', Carpenters', etc., Chests,
 with Tools ... 30¢

Machinists' and Pipe Fitters'
 Chests, Empty ... 50¢
 Tool Cabinets ... 50¢
 C. E. Jennings & Co.'s Machinists'
 Tool Chests ... 33¢

Chisels—

Socket Framing and Firmer
 Standard List ... 75¢
 Buck Bros. ... 75¢
 Charles Buck Edge Tool Co. ... 30¢
 C. E. Jennings & Co.:
 Socket Firmer No. 10 ... 60¢
 Socket Framing No. 15 ... 60¢
 Swan's ... 75¢
 L. & I. J. White Co. ... 30¢

Tanged—

Tanged Firmers ... 40¢
 Buck Bros. ... 30¢
 Charles Buck Edge Tool Co. ... 30¢
 C. E. Jennings & Co. No. 131 ... 25¢
 L. & I. J. White Co. ... 25¢

Cold—

Cold Chisels, good quality, 13¢
 Cold Chisels, fair quality, 11¢
 Cold Chisels, ordinary ... 9¢

Chucks—

Almond Drill Chucks ... 35¢
 Almond Turret Six-Tool Chuck ... 40¢
 Beach Pat., each \$6.00 ... 35¢
 Empire ... 25¢
 Blacksmiths' ... 25¢
 Jacobs' Drill Chucks ... 35¢
 Pratt's Positive Drive ... 25¢
 Skinner Patent Chucks ... 25¢
 Independent Lathe Chucks ... 40¢
 Universal Reversible Jaws ... 40¢
 Combination, Reversible Jaws ... 40¢
 Drill Chucks, New Model, 25¢
 25¢; Positive Drive, Skinner Pat.
 Planer Chucks ... 30¢
 Face Plate Jaws ... 40¢
 Standard Tool Co. ... 45¢
 Improved Drill Chuck ... 45¢
 Union Mfg. Co.:
 Combination, No. 1, 2, 3, 4, 5, 6,
 7, 8 and 17, 40¢; No. 21 ... 35¢
 Scroll Combination, No. 82 and
 84 ... 30¢
 Geared Scroll, No. 33, 34 and 35, 30¢
 Independent Iron, No. 18 and 318, 35¢
 Independent Steel, No. 64 ... 25¢
 Union Drill, No. 600, 60, 100, 101,
 102, 104, 105, 106, 107, 108, 109,
 110, 111, 112, 113, 114, 115, 35¢
 Union Gear Drill ... 25¢
 Universal 11, 12, 16, 17, 13, 14, 15, 35¢
 Universal, No. 42 ... 30¢
 Iron Face Plate Jaws, Nos. 28, 30,
 48 and 50 ... 35¢
 Steel Face Plate Jaws, Nos. 70 and
 72 ... 35¢
 Westcott Patent Chucks ... 30¢
 Lathe Chucks ... 50¢
 Little Giant Auxiliary Drill ... 50¢
 Little Giant Double Grip Drill ... 50¢
 Little Giant Drill, Improved ... 50¢
 Oneida Drill ... 50¢
 Scroll Combination Lathe ... 50¢

Clamps—

Adjustable, Hammers' ... 30¢
 Carriage Makers', P. S. & W. ... 40¢
 Besly, Parallel ... 33¢
 Lineman's, Utica Drop Forge & Tool
 Co. ... 40¢
 Wood Workers, Hammers' ... 40¢
 Saw Clamps, see Vices, Saw Filers.

Cleaners, Drain—

Iwan's Champion, Adjustable ... 50¢
 Iwan's Champion, Stationary ... 45¢

Sidewalk—

Star Socket, All Steel, 9¢ doz. \$1.05 net.
 Star Shank, All Steel, 9¢ doz. \$1.05 net.
 W. & C. Shank, All Steel, 9¢ doz.
 7 1/2 in., \$3.00; 8 in., \$3.25.

Cleavers, Butchers—

Foster Bros. ... 30¢
 Fayette R. Plumb ... 30¢
 L. & I. J. White Co. ... 30¢

Clippers, Horse and

Chicago Flexible Shaft Company:
 1902 Chicago Horse, each, \$10.75
 20th Century Horse, each, \$5.00
 Lightning Belt Horse, each, \$3.00
 Chicago Belt Horse, each, \$3.00

Stewart's Enclosed Gear

Horse, each ... \$1.75
 Stewart's Patent Sheep Shear-
 ing Machine, each ... \$12.75
 Stewart's Enclosed Gear Shear-
 ing Machine, No. 8, each ... \$9.75

Clips, Axle—

Regular Clips, list July 1, '05, 80¢
 Cloth and Netting, Wire
 —See Wire, &c.

Cocks, Brass—

Hardware Hat:
 Plain Bids, Globe, Kerosene,
 Racking, Liquor, Bottling,
 &c. ... 70¢
 Compression Bids ... 65¢

Coffee Mills—

See Mills, Coffee.

Collars, Dog—

Nickel Chain, Walter B. Stevens &
 Son's list ... 40¢
 Leather, Walter B. Stevens & Son's,
 list ... 30¢

Combs, Curry—

Metal Stamping Co. ... 40¢

Compasses, Dividers, &c.

Ordinary Goods ... 70¢
 Wm. Schollhorn Co.:
 Excelsior Dividers ... 35¢
 Lodi Dividers ... 75¢

Conductor Pipe,—

L. O. L. to Dealers:

Galv.	Charcoal	Copper.
Steel.	Iron.	14, 16 & 20 oz.
Eastern:	60%	30¢10%
70¢12½%		
Central:	55¢15%	30¢7½%
65¢12½%		
Western and Southern:	55%	30¢5%
65¢7½%		
So. Western:	50¢12½%	30¢3½%
60¢15%		

Terms, 60 days; 2% cash 10 days. Factory shipments generally delivered.

See also Eave Troughs.

Coolers, Water—

Gal. each, 2 3 4 5 6 8
 Labrador ... \$1.20 \$1.50 \$1.80 \$2.10 \$2.70
 Gal. ... 3 4 5 6 8
 Ice, ea. \$1.50 \$2.10 \$2.40 \$2.70 \$3.30
 Gal. ... 2 3 4 5 6 8
 Galvanized, ea. \$1.85 \$2.00 \$2.25 \$2.50 \$3.00
 Galvanized, Lined, side handles,
 Gal. ... 2 3 4 5 6 8
 Each ... \$1.95 \$2.15 \$2.40 \$2.70 \$3.15
 White Enamelled, 25¢; Agate Lined, 25¢

Coopers' Tools—

See Tools, Coopers'.

Coppers' Soldering—

Soldering Coppers, 3 lbs. to pair
 and heavier, 30¢3½¢; lighter
 than 3 lbs. to pair ... 32¢33¢

Cord—

Sash—

Braided, Drab ... 1b. 35¢

Braided, White, Com., Nos. 8
 to 12, 25¢; No. 7, 25¢; No. 6,
 26½¢.

Cable Laid Italian, lb., No. 18.

Italian, lb., A, No. 18, 25¢; B, 21¢

Common India ... 1b. 10¢10½¢

Cotton Sash Cord, Twisted, 17¢19¢

Patent Russia ... 1b. 19¢

Cable Laid Russia ... 1b. 20¢

India Hemp, Br'd'd. ... 1b. 20¢

India Hemp, Twisted, 1b. 12¢13¢

Patent India, Twisted, 1b. 16¢

Anastion Cordage Co.: 1b. solid

Braided, Nos. 8 to 12, 30.24; No. 7,

30.24; No. 6, 30.25; 9¢ doz. 50 ft.,

Oriele, 20¢; 50 ft., Columbia, 20.85;

50 ft., Victoria, 19.00; 50 ft., 6-Thread,

\$1.10; 60 ft., 3-Thread, 30.95; 60 ft.,

Manila, \$1.40; 60 ft., Jute, 30.75.

Pearl Braided, cotton, No. 6, 30.75

25¢; No. 7, 25¢; Nos. 8 to 12, 24½¢

Eddystone Braided, Nos. 8 to 10,

25¢; No. 6, 25¢; 30.4¢

Harmony Cable Laid Italian, Nos. 7

to 10 ... 10.23 10.23

Pullman:

Wire Sash Cord ... 10%

Sash Cord Attachments, per doz. 10¢

Samson, Nos. 8 to 12:

1b. Drab, 1b. Drab Cotton,

55¢; Italian Hemp, 40¢

50¢; Linen, 55¢; White Cot-

ton, 50¢; Spot Cord ... 50¢

Massachusetts, White ... 1b 40¢

Massachusetts, Drab ... 1b 45¢

No. 7, 25¢; No. 6, 30¢

Phoenix, White, Nos. 8 to 12, 27¢

Silver Lake, per lb.: A, White, 40¢;

B, Drab, 40¢; B, White, 35¢;

Italian Hemp, 40¢; Linen ... 57½¢

See also Chain and Ribbon.

Wire, Picture—

List July 13, 1906 ... 55¢104¢10¢

Houdryx Standard Wire Picture Cord,
 old list, 65¢10%

Cradles—

Grain ... 40¢12½%

Crayons—

White Round Crayons, Cases, 100
 gro., \$6.50@\$7.50 at factory, but
 lower prices made by jobbers

Zelicker's Lumber, 9¢ gro.

White and Purple, Indelible ... 40¢

Blue, Red, Green, Yellow and

Terra Cotta, \$4.50; Black ... \$4.00

Genuine Soapstone, Metal Workers'
 5 in. x 3/4 in. Round, \$2.50; 5 in. x

3/4 in. Square, \$1.75; 5 x 3/4 x 3-16,

\$2.50; 5 x 1 1/4 x 3-16 ... \$3.00

Crooks, Shepherds—

Fort Madison, per doz., Heavy, \$7.00;

Light ... \$6.50

Crow Bars—See Bars, Crow.**Cultivators—**

Victor Garden ... 50%

Cutlery, Table—

International Silver Company:
 No. 12 M'd'm Knives, 1817, 9¢ doz. \$3.90

Star, Eagle, Rogers & Hamilton,
 and Anchor ... 9¢ doz. \$3.00

Wm. Rogers & Son ... 9¢ doz. \$2.50

Cutters—

H. H. Mayhew Co. ... 40%

Red Devil ... 50%

Smith & Hemenway Co. ... 50%

Meat and Food—

American ... 30%

Nos. 401 402 403 404 405 406 407

Each ... \$5 \$7 \$10 \$12 \$25 \$50 \$60

Enterprise:
 Nos. ... 5 10 12 22 32

Each ... \$2 \$3 \$2.75 \$4.50 \$6 \$5.25 \$7.75

No. 212, \$1.50 ... 40¢12½%

Dixon's ... 9¢ doz. 30¢30½%

Nos. ... \$14.00 \$17.00 \$19.00 \$23.00

Ideal ... 40¢40½%

Little Giant ... 9¢ doz. 40¢50%

Nos. ... 305 310 312 323 322

\$35.00 \$48.00 \$14.00 \$7.00 \$8.00

N. E. Food Choppers ... 25%

New Triumph No. 605, 9¢ doz. \$3.90

Russwin Food, No. 1, \$21.00; No. 2,

\$27.00 ... 65¢104½%

Woodruff's ... 100 150

No. ... \$15.00 \$18.00

Enterprise Beef Shavers ... 25¢30%

Slaw and Kraut—

Henry Diston & Sons:
 Slaw and Kraut Cutters ... 30¢
 Corn Graters ... 30¢
 J. M. Mast Mfg. Co.:
 Slaw Cutters, 1 Knife ... 9¢ doz. \$3.00
 Combined Slaw Cutter and Corn
 Grater ... 9¢ doz. \$3.00
 Tucker & Dorsey Mfg. Co.:
 Kraut Cutters ... 40¢
 Slaw Cutters, 1 Knife ... 9¢ gr. \$18.00
 Slaw Cutters, 2 Knife ... 9¢ gr. \$22.00

Tobacco—

All Iron, Cheap ... doz. \$4.25@\$4.50
 Enterprise ... 25¢30¢
 National, 9¢ doz., No. 1, \$21; No

Extractors, Lemon Juice

—See Squeezers, Lemon.

Fasteners, Blind—

Zimmerman's 50¢10%
Walling's 50¢10%

Cord and Weight—

Ives 33%4%

Faucets—

Cork Lined 50¢60¢10%
Metallic Key, Leather Lined 60¢10¢70%

Red Cedar 40¢10¢50%
Petroleum 70¢10¢75%

B. & L. B. Co.:
Metal Key 60¢10%
Star 50¢10%

John Sommer's Peerless Tip Key 40%
John Sommer's Boss Tin Key 50%
John Sommer's Victor Mtl. Key 50¢10%

John Sommer's Duplex Metal Key 60%
John Sommer's Diamond Lock 40%
John Sommer's L. X. L. Cork Lined 50%

John Sommer's Reliable Cork Lined 50¢10%
Rival 50¢10%
John Sommer's Chicago Cork Lined 60%

John Sommer's O. K. Cork Lined 50%
John Sommer's No Brand, Cedar 50%
John Sommer's Perfection, Cedar 40%

McKenna, Brass:
Burglar Proof, N. P. 25%
Improved, 1/2 and 3/4 inch 25%

Self Measuring:
Enterprise, 1/2 doz. 33¢ 40¢10%
Lane's, 1/2 doz. 33¢ 40¢10%
National Measuring, 1/2 doz. 33¢ 40¢10%

Felloe Plates—

See Plates, Felloe.

Files— Domestic—

List Nov. 1, 1899.
Best Brands 70¢10¢75¢10%
Standard Brands 75¢10¢75¢10%
Lower Grade 75¢10¢10¢90¢10%

Imported—

Stubs' Tapers, Stubs' list, July 24, '97 33 1-3 40%

Fixtures, Fire Door

Richards Mfg. Co.:
Universal, No. 103; Special, No. 104 33 1-3 40%
Fusible Links, No. 96 60%
Expansion Bolts, No. 107 60¢10%

Grindstone—

Net Prices:
1/2 inch 15 17 19 21
1/4 doz. 33 25 3 75 4 25 4 75
P. & W. Co. 30¢10%
Reading Hardware Co. 60%
Stowell's Giant Grindstone Hanger 40%
Stowell's Grindstone Fixtures, Extra Heavy, 40¢10%; Light 50%

Fodder Squeezers—

See Compressors.

Forks—

NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.

Iowa Dig-Ezy Potato 60¢10%
Victor, Hay 60¢15¢24%
Victor, Manure 60%
Victor, Header 60%
Champion, Hay 60%
Champion, Header 60%
Champion, Manure 60¢15¢24%
Columbia, Hay 60¢20%
Columbia, Manure 70%
Columbia, Spading 70¢12%
Hawkeye Wood Barley 60%
W. & C. Potato Digger 60%
Acme Hay 60¢20%
Acme Manure, 4 tine 60¢10¢5%
Dakota Header 60¢20%
Jackson Steel Barley 60¢20%
Kansas Header 60%
W. & C. Favorite Wood Barley 40%
Plated.—See Spoons.

Frames— Saw—

White, S'ot Bar, per doz. 75¢80¢
Red, S'ot Bar, per doz. 110¢115¢
Red, Dbl. Brace, per doz. 110¢115¢

Freezers, Ice Cream—

Qt. 1 2 3 4 6
Each \$1.30 \$1.60 \$1.90 \$2.20 \$2.50

Fruit and Jelly Presses—

See Presses, Fruit and Jelly.

Fry Pans—See Pans, Fry.

Fuse— Per 1000 Feet.

Hemp 33 1-3 40%
Cotton 3 20
Waterproof Spl. Taped. 3 65
Waterproof Dbl. Taped. 4 40
Waterproof Tpl. Taped. 5 15

Gates, Molasses and Oil—

Stebbins' Pattern 60¢10%

Gauges—

Marking, Mortise, &c. 50¢50¢10%
Chapin-Stephens Co.:
Marking, Mortise, &c. 50¢50¢10%
Diston's Marking, Mortise, &c. 67%
Stanley R. & L. Co.'s Butt and Rabbit Gauge 35%
Marking and Mortise 55%
Wire, Brown & Sharpe's 33%
Wire, Morse's 25%
Wire, P. S. & W. Co. 30%

Gimlets— Single Cut—

Numbered assortments, per gro.
Nail, Metal, No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

Spike, Metal, No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876,

Screw Hook and Eye:

1/2 to 1 inch.....lb. 6¢
 1/2-inch.....lb. 7¢
 1/2-inch.....lb. 8¢

Hitchers, Stall—

Covert Mfg. Co., Stall Hitchers.....30¢

Heds—Coal—

Mfg's list, price per gross.

Galv. Open.....\$35 \$32 \$42 \$46
 Jap. Open.....36 35 31 35
 Galv. Funnel.....43 48 52 56
 Jap. Funnel.....51 56 59 63

Masons' Etc.—

Cleveland Wire Spring Co.:
 Steel Brick, No. 122.....each \$1.05
 Steel Mortar, No. 158.....each \$1.25

Hoes—Eye—

Scovill and Oval Pattern.....60¢

Grub, Nat Feb. 23, 1899.....70¢

D. & H. Scovill.....30¢

Handled—

NOTE—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.

Cronk's Weeding, No. 1, \$2.75; No. 2, \$2.50

Star Double Bit.....\$3.20

St. Madison Cotton Hoe.....\$4.00

St. Madison Crescent Cultivator Hoe.....\$4.00

St. Madison Mattock Hoes.....\$4.00

Regular Weight.....\$4.00

Junior Size.....\$4.00

St. Madison Sprouting Hoe.....\$4.00

St. Madison Dixie Tobacco Hoe.....\$4.00

Kretzinger's Cut Easy.....\$4.00

Warren Hoe.....\$4.00

W. & C. Ivanhoe.....\$4.00

B. R. 6 in. Cultivator Hoe.....\$4.00

B. R. 6 in. Hoe.....\$4.00

Acme Weeding.....\$4.00

W. & C. L'ning Shuffie Hoe.....\$4.00

Holding Apparatus—

See Machines, Hoisting.

Holders—Bit—

Angular, 1/2 doz. \$34.00.....\$5.10

Door—

Bardley's, Iron, 40%; Brass and Bronze.....33%

Empire.....36%

Pullman.....36%

Superior.....36%

File and Tool—

Nicholson File Holders and File Handles.....\$3.40

Fruit Jar—

Triumph Fruit Jar Holder, 1/2 gross, \$10.50; 1/2 doz. \$1.25

Trace and Rein—

Fernald Double Trace Holder, 1/2 doz. pairs.....\$1.25

Dash Rein Holder, 1/2 doz. pairs.....\$1.25

Hones—Razor—

Pike Mfg. Co., Belgian, German and Swat.....\$5.00

Hooks—Cast Iron—

Bird Cape, Reading.....40%

Clothes Line, Reading List.....40%

Clothes Line, Stowell's.....40%

Coat and Hat, Reading.....40%

Coat and Hat, Stowell's.....40%

Coat and Hat, Wrightville.....40%

Harness, Reading List.....40%

Harness, Stowell's.....40%

School House, Stowell's.....40%

Wire—

Wire C. & H. Hooks.....\$4.10

Columbian Hdw Co., Gem.....70¢

Parker Wire Goods Co., King.....70¢

Western W. G. Co. Molding.....75¢

Wire Goods Co.:
 Acme, 60¢; Chief, 70¢; Crown, 75¢; Clear, 65¢; Y. Brace, 75¢; Clear Harness, 60¢

Wrought Iron—

Box, 6 in., per doz., \$1.00; 8 in., \$1.25; 10 in., \$2.50

Cotton.....doz. \$1.05

Wrought Staples, Hooks & C—See Wrought Goods

Miscellaneous—

Hooks, Bench, see Staps, Bench.

Bush, Light, doz. \$1.75; Medium, \$5.35; Heavy, \$6.55

Grass, best, all sizes, per doz. \$1.00

Grass, common grades, all sizes, per doz.....\$1.30

Whiffletree.....lb. 5¢

Hooks and Eyes:
 Brass.....60¢
 Malleable Iron.....60¢
 Covert Mfg. Co. Gate and Seattle Hooks.....40%

St. Madison Cut-Easy Corn Hooks.....\$2.25 net

Bench Hooks—See Bench Stops.

Corn Hooks—See Knives, Corn.

Horse Nails—

See Nails, Horse.

Horsehoes—

See Shoes, Horse.

Hose, Rubber—

Garden Hose, 1/2-inch:
 Competition.....ft. 5 @ 6
 3-ply Guaranteed.....ft. 8 @ 9
 4-ply Guaranteed.....ft. 10 @ 11
 Cotton Garden, 1/2-in., coupled:
 Low Grade.....ft. 8 @ 9
 Fair Quality.....ft. 10 @ 11

Irons—Sad—

From \$1.00 to \$1.50.....lb. 3 @ 5¢
 R. B. Sad Irons.....lb. 3 @ 5¢
 Mrs. Potts' cents per set:
 No. 20 25 30 35
 Jap'd Tops.....72 60 82 70

Tin'd Tops.....77 74 87 84

New England Pressing.....lb. 3 @ 5¢

Pinking.....doz. 60¢

Pinking Irons.....doz. 60¢

Irons, Soldering
 See Copiers.

Jacks, Wagon—
 Covert Mfg. Co.:
 Auto Screw.....30¢; Steel, 45%

Lockport.....50%

Lane's Steel.....30¢

Richards' Tiger Steel, No. 130.....50¢

Smith & Hemenway Co.'s.....35%

Kettles—
 Brass, Spun, Plain.....\$2.25

Enameled and Cast Iron—See Ware, Hollow.

Knives—
 Butcher, Kitchen, & C.—
 Foster Bros. Butcher, & C.....30%

Wilkinson Shear & Cutlery Co.....60%

Corn—
 Wilkinson Shear & Cutlery Co.
 Wilcox Brand Knives and Hooks.....60%

Wilkinson Acme, 1/2 doz. \$2.65;
 Dent, \$2.15; Ad. Serrated, \$2.30;
 Serrated, \$2.10; Yankee No. 1, \$1.50;
 Yankee No. 2, \$1.15.

Drawing—
 Standard List.....75¢

C. E. Jennings & Co., Nos. 45, 46, 50;
 Jennings & Griffin, Nos. 41, 42.....75%

Swan's.....70%

Watrous.....15%

L. & J. White.....30%

Hay and Straw—
 Serrated Edge, per doz. \$5.75

Iwan's Sickle Edge.....\$5.50

Iwan's Serrated.....\$5.00

Mincing—
 Buffalo.....gro. \$13.00

Miscellaneous—
 Farriers'.....doz. \$3.00

Wootenholm's.....doz. \$3.00

Knobs—
 Base, 1/4-inch, Birch, or Maple,
 Rubber Tip.....gro. \$1.25

Carriage, Jap., all sizes.....gro. \$1.40

Door, Mineral.....doz. 65¢

Door, Por. Jap'd.....doz. 70¢

Door, Por. Nickel.....doz. 80¢

Bardley's Wood Door, Shutters, & C. 15%

Lacing, Leather—
 See Belting, Leather—

Ladders, Store, & C.—
 Allith Mfg. Co., Reliable.....50%

Lane's Store.....25%

Myers' Noiseless Store Ladders.....50%

Richards' Mfg. Co.:
 Improved Noiseless, No. 112.....50%

Climax Shelf, No. 113.....50%

Trolley, No. 100.....50%

Ladies, Melting—
 L. & G. Mfg. Co. (low list).....25%

S. & W.....40%

Reading.....60%

Lanterns—Tubular—
 Regular Tubular, No. 0.....doz. \$1.25

Lift Tubular, No. 0.....doz. \$1.75

Hinge Tubular, No. 0.....doz. \$1.75

Other Styles.....doz. \$1.75

Bull's Eye Police—
 No. 1, 2 1/2-inch.....\$2.75

No. 2, 3-inch.....\$3.00

Lasts and Stands, Shoe—
 Stowell's Atlas, Malleable Iron.....50%

Stowell's Badger, Cast Iron.....50%

Latches—Thumb—
 Roggin's Latches, with screw.....doz. 35¢

Door—
 Allith Mfg. Co., Automatic, No. 400.....\$4.00

Crook & Carrier Mfg. Co., No. 101.....\$2.00

Cronk & Carrier Mfg. Co., Latch, Hasp and Staples.....50%

Richards' Bull Dog, Heavy, No. 125.....50%

Richards' Trump, No. 127.....\$1.00

Stowell's Steel.....50%

Leaders, Cattle—
 Small.....doz. 60¢; large, 60¢

Covert Mfg. Co.:
 Cotton, 45%; Hemp, 45%; Jute, 35%;
 Sisal, 20%.

Lifters, Transom—
 R. & E.....10%

Lines—
 Wire Clothes, Nos. 28 29 30
 100 feet.....\$2.25 2.00 1.75

75 feet.....\$1.75 1.55 1.10

Anniston Waterproof Clothes, 50 ft.,
 1/2 gro. \$25.00; Gilt Edge, \$25.00; Air
 Line, \$25.00; Acme, \$18.00; Alabama,
 \$17.00; Empire, \$16.00; Advance,
 \$14.00; Eclipse, \$13.50; Chicago,
 \$10.50; Standard, \$10.50; Columbia,
 \$9.50; Alliston, \$13.50; Calhoun, \$12.00.

Samen Cordage Works:
 Solid Braided Chalk, No. 0 to 3, 40%
 Solid Braided Masons'.....30%

Silver Lake Braided Chalk, No. 0,
 \$6.00; No. 1, \$4.50; No. 2, \$7.00; No. 3,
 \$7.50.

Masons' Lines, Shade Cord, & C.:
 White Cotton, No. 5, \$1.50; No. 4,
 \$2.00; No. 4 1/2, \$2.50; Colors, No. 3 1/2,
 \$1.75; No. 4, \$2.25; No. 4 1/2, \$2.75;
 Linen, No. 3 1/2, \$2.50; No. 4, \$3.50;
 No. 4 1/2, \$4.50.

Tent and Awning Lines: No. 5,
 White Cotton, \$7.50; Drab Cotton,
 \$6.50.

Clothes Lines, White Cotton: 50 ft.,
 \$2.75; 60 ft., \$3.25; 70 ft., \$3.75;
 80 ft., \$4.00; 90 ft., \$4.25; 100 ft.,
 \$5.25.

Locks—Cabinet—
 Cabinet Locks.....33 1/2 @ 33 1/2 @ 37 1/2

Door Locks, Latches, & C.—
 NOTE—Net prices are very often made
 on these goods.

Reading Hardware Co.....40%

R. & E. Mfg. Co.....10%

Elevator—
 Stowell's.....50%

Padlocks—
 R. & E. Mfg. Co. Wrought Steel and
 Brass.....75¢

Sash, & C.—
 Ives' Patent:
 Bronze and Brass, 60%; Crescent,
 40%; Iron, 60%; Window Ventila-
 ting, 55%; Robinson Pat. Ventila-
 ting Sash Lock, 35%; Wrought
 Bronze and Brass, 55%; Wrought
 Steel, 55%.

Pullman Patent Ventilating Lock.....35%

Reading.....40%

Machines—Boring—
 Com. Up'r, without Augers,
 \$2.00 @ \$2.25

Com. Ang'l'r, without Augers,
 \$2.25 @ \$2.50

Swan's Improved.....\$4.10

Jennings' Nos. 1 and 4.....35%

Millers' Falls.....3.75

Snell's, Upright, \$2.65; Angular, \$2.90

Corking—
 Heisinger Invincible Hand Power.....\$48.00

Fence—
 Williams' Fence Machines.....each, \$5.00

Hoisting—
 Moore's Anti-Friction Chain Hoist.....30%

Moore's Hand Hoist, with Lock.....20%

Moore's Cyclone High Speed Chain
 Hoist.....25%

Ice Cutting—
 Chandler's.....12 1/2%

Washing
 Boss Washing Machine Co.: Per doz.
 Boss No. 1.....\$57.00

Boss Rotary.....\$57.00

Champion Rotary Banner No. 1.....\$57.00

Standard Champion No. 1.....\$57.00

Standard Perfection.....\$57.00

Cincinnati Square Western.....\$57.00

Uneda American, Round.....\$57.00

Mallets—
 Hickory.....\$5.45 @ 50%

Lignumite.....\$5.45 @ 50%

Tinners' Hickory and Apple-
 wood.....doz. \$5.45 @ 50%

Mangers, Stable—
 Swett Iron Works.....50%

Mashers, Vegetable—
 Western, W. G. Co., Potato.....60¢ @ 10%

Mats, Door—
 Elastic Steel (W. G. Co.), new list.....50%

Kayston Wire Matting Co.:
 Keystone.....50%

Ideal.....50%

Mattocks—
 See Picks and Mattocks.

Milk Cans—See Cans, Milk.

Mills, Coffee, & C.—
 Enterprise Mfg. Co.....20¢ @ 25%

National list Jan. 1, 1902.....30%

Parker's Columbia & Victoria.....50¢ @ 60%

Parker's Box and Side.....50¢ @ 60%

Swift, Lane Bros. Co.....30%

Motors Water—
 Divine's Red Devil.....30%

Mowers, Lawn—
 NOTE—Net prices are generally quoted
 Cheap.....all sizes, \$1.85 @ 2.00

Better Grade.....all sizes, \$2.00 @ 2.50

High Grade.....all sizes, \$2.50 @ 4.50

Continental.....\$4.50 4.75 5.00 5.25

Great American Ball B'r'g. new list.....70%

Quaker City.....70%

Pennsylvania.....60%

Pennsylvania, Jr., Ball Bearing.....60%

Pennsylvania Golf.....50%

Pennsylvania.....30¢ @ 35%

Pennsylvania Pony.....40¢ @ 45%

Granite State:
 Style A, Low Wheel.....70¢ @ 10¢

Style B, Low Wheel.....70¢ @ 10¢

Style C, High Wheel.....70¢ @ 10¢

Style D, High Wheel.....70%

Philadelphia:
 Style M. S. C. K. T.....70¢ @ 10¢

Style M. S. all Steel.....60¢ @ 10¢

Style E, High Wheel.....70¢ @ 10¢

5.00¢
5.40¢
4.70¢
5.10¢

61¢
1b, 6¢
1b, 5¢
1b, 4¢
1b, 3¢

Oil.

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Potato—
Saratoga..... $\frac{1}{2}$ doz. \$7.00
White Mountain..... $\frac{1}{2}$ doz. \$6.00

Picks and Mattocks—
List, Feb. 23, 1899.....70¢10¢75¢
Cronk's Handled Garden Mattock,
doz. No. 2, \$2.00; No. 3, \$6.00.

Finking Irons—
See Irons, Pinking.

Fins, Escutcheon—
Brass.....50¢10¢60¢
Iron, list Nov. 11, '85.....60¢60¢10¢

Pipe, Cast Iron Soil—
Carload lots.
Standard, 2-6 in. 50¢10¢50¢10¢5¢
Extra Heavy, 2-6 in. 65¢10¢
Fittings.....70¢10¢70¢10¢5¢

Pipe, Merchant—
Consumers, Carloads.
Steel.
Blk. Galv. Blk. Galv.

$\frac{1}{2}$ & $\frac{3}{4}$ in. 67 51 64.5 48.5
 $\frac{1}{2}$ in. 69 55 64.5 56.5
 $\frac{1}{2}$ to 6 in. 71 59 72.5 62.5
7 to 12 in. 70 55 68 53

Pipe, Vitrified Sewer—
Carload lots.
Standard Pipe and Fittings, 3
to 24 in., f.o.b. factory:
First-class.....85¢86¢
Second-class.....90¢
NOTE.—Market irregular.

Pipe, Stove—
Per 100 joints.
Edwards' Nested: C. L. L. C. L.

6 in. Standard Blue.....\$6.25 \$7.25
3 in. Standard Blue.....7.75 7.75
5 in. Standard Blue.....7.75 7.75
6 in. Royal Blue.....7.00 8.00
5 in. Royal Blue.....7.50 8.50
7 in. Royal Blue.....8.50 9.50

Planes and Plane Irons—
Wood Planes—
Bench, first qual.....30¢30¢10¢
Bench, second qual.....40¢40¢10¢
Molding.....25¢25¢10¢
Bailey's (Stanley B. & L. Co.).....35¢24¢
Chapin-Stephens Co.:
Bench, First Quality.....30¢
Bench, Second Quality.....40¢
Molding and Miscellaneous.....25¢
Toy and German.....30¢
Union.....60¢

Plane Irons—
Wood Bench Plane Irons, list
Dec. 12, '06.....85¢
Buck Bros.....30¢
Chapin-Stephens Co.....30¢
Stanley B. & L. Co.....30¢
Union.....50¢
L. & J. J. White.....30¢50¢25¢

Planters, Corn, Hand—
Kohler's Eclipse..... $\frac{1}{2}$ doz. \$8.00

Plates—
Feltos.....1b. 40¢44¢
Self-Sealing Pie Plates (B. M.
Co.). $\frac{1}{2}$ doz. \$2.00.....50¢

Pliers and Nippers—
Button Pliers.....75¢10¢75¢10¢5¢
Gas Burner, per doz., 5 in., \$1.25
@ \$1.50; 6 in., \$1.45 @ \$1.50.
Gas Pipe.....7 5 10 12-14
\$2.00 \$2.25 \$2.75 \$3.50

Acme Nippers—
Cronk & Carrier Mfg. Co.:
American Button.....75¢10¢
Cronk's.....50¢
Stub's Pattern.....50¢
Combination and others.....35¢
Heller's Farriers' Nippers, Pincers
and Tools.....40¢50¢40¢10¢5¢
The Nettleton Mfg. Co. Reversible
Cutting Nippers.....40¢
P. S. & W. Tinner's Cutting Nip-
pers.....40¢
Wm. Schollhorn Co.:
Bernard, 34%; Elm City, 34%;
Paragon, 50%; Lodi, 50%.
Swedish Side, End and Diagonal Cut-
ting Pliers.....50¢
Ulrich Drop Forge & Tool Co.:
Pliers and Nippers, all kinds.....50¢

Plumbers and Levels—
Chapin-Stephens Co.:
Plumbers and Levels.....30¢30¢10¢5¢
Chapin's Imp. Brass Cor. 40¢40¢10¢
Pocket Levels.....30¢30¢10¢5¢
Extension Sights.....30¢30¢10¢5¢
Machinists' Levels.....40¢40¢10¢
Dixson's Plumbers and Levels.....64¢10¢
Dixson's Pocket Levels.....60¢10¢
C. E. Jennings & Co.'s Iron.....35¢
C. E. Jennings & Co.'s Iron, Adjustable
shoe.....40¢
Stanley B. & L. Co.....40¢
Stanley's Duplex.....30¢
Woods' Extension.....35¢

Poachers, Egg—
Buffalo Steam Egg Poachers, $\frac{1}{2}$ doz.,
No. 1, \$6.00; No. 2, \$9.00; No. 3,
\$9.00; No. 4, \$12.00.....50¢

Points, Glaziers—
Rulk and 1-lb. papers.....1b. 10¢
16 lb. papers.....1b. 9¢10¢4¢
14 lb. papers.....1b. 9¢11¢

Pokes, Animal—
Ft. Madison Hawkers..... $\frac{1}{2}$ doz. \$3.25
Ft. Madison Western..... $\frac{1}{2}$ doz. \$4.00

Police Goods—
Manufacturers' Lists.....25¢25¢5¢
Tower's.....25¢

Polish—Metal, Etc—

Glaabrite, No. 2, 5 lb can (powder),
each, \$1.25; $\frac{1}{2}$ doz. \$12.00; No. 2, 10 lb
can (cake), each, \$2.50; $\frac{1}{2}$ doz. \$24.00.

Prestoline Liquid, No. 1 ($\frac{1}{2}$ pt.).
doz. \$3.00; No. 2 (1 qt.), \$9.00. 40¢
Prestoline Paste.....40¢

George William Hoffman:
U. S. Metal Polish Paste, 3 oz.
boxes, $\frac{1}{2}$ doz. 50¢; $\frac{1}{2}$ doz. \$4.50.
 $\frac{1}{2}$ lb boxes, $\frac{1}{2}$ doz. \$1.25; 1 lb
boxes, $\frac{1}{2}$ doz. \$2.25.

U. S. Liquid, 8 oz cans, $\frac{1}{2}$ doz.,
\$1.25.
Barkeepers' Friend Metal Polish, $\frac{1}{2}$
doz., \$1.75.

Stove—

Black Eagle Benzine Paste, 5 lb cans,
each, \$1.00; $\frac{1}{2}$ pt. cans,
each, \$1.00.

Black Jack Paste, $\frac{1}{2}$ lb cans, $\frac{1}{2}$ doz. 75¢
Black Kid Paste, 5 lb cans, each, \$0.65
Ladd's Black Beauty Liquid, per
100 tins.....\$4.75

Joseph Dixon's, $\frac{1}{2}$ gr. \$5.75.....10¢
Dixon's Plumbago.....2¢
Firestone..... $\frac{1}{2}$ gr. \$2.50
Gem, $\frac{1}{2}$ gr. \$4.50.....10¢

Japanese..... $\frac{1}{2}$ gr. \$3.50
Jet Black..... $\frac{1}{2}$ gr. \$3.50
Peelless Iron Enamel, 10 oz cans,
doz. \$1.50.

Wynn's Black Silk:
Paste, cans, $\frac{1}{2}$ doz., 5 oz., \$0.75;
 $\frac{1}{2}$ lb, \$1.00; 1 lb, \$1.75.
Paste, $\frac{1}{2}$ lb cans, each, \$0.70
Liquid, cans, $\frac{1}{2}$ doz., 6 oz., \$0.75;
 $\frac{1}{2}$ pt., \$1.00; 1 pt., \$1.75.
Steel Range Enamel, $\frac{1}{2}$ doz., $\frac{1}{2}$ pt.,
\$1.00; $\frac{1}{2}$ pt., \$1.25.

Poppers, Corn—
1 qt. Square.....gro. \$8.50
1 qt., Round.....gro. \$9.50
 $\frac{1}{2}$ qt., Square.....gro. \$10.50
2 qt., Square.....gro. \$12.50

**Post Hole and Tree Au-
gers and Diggers—**
See also Diggers, Post Hole, &c.

Posts, Steel—
Steel Fence Posts, each, 5 ft., 42¢;
6 ft., 46¢; 6 1/2 ft., 48¢.
Steel Hitching Posts.....each \$1.30

Potato Parers—
See Parers, Potato.

Pots, Glue—
Enamelled.....35¢10¢
Tinned.....30¢10¢

Powder—
In Canisters:
Duck, 1 lb.....each 45¢
Fine Sporting, 1 lb.....each 75¢
Rifle, 1 lb.....each 15¢
Rifle, 1 lb.....each 25¢

In Kegs:
12 1/2-lb. kegs.....\$3.50
25-lb. kegs.....\$4.50
King's Semi-Smokeless:
Keg (25 lb bulk).....\$6.50
Keg (12 1/2 lb bulk).....\$3.50
Quarter Keg (6 1/4 lb bulk).....\$1.90
Case 24 (1 lb cans bulk).....\$4.50
Half case (1 lb cans bulk).....\$4.50
King's Smokeless: Shot Gun Rifle.
Keg (25 lb bulk).....\$12.00 \$15.00
Half Keg (12 1/2 lb bulk).....4.25 7.75
Quarter Keg (6 1/4 lb bulk).....3.25 4.00
Case 24 (1 lb cans bulk).....14.50 17.00
Half case (1 lb c. bk.).....7.25 8.75
Robin Hood Smokeless Shot Gun, 50¢20¢

Presses—
Fruit and Jelly—
Enterprise Mfg. Co.....30¢25¢

Seal Presses—
Morrill's No. 1, $\frac{1}{2}$ doz., \$30.00.....50¢

Pruning Hooks and Shears
See Shears.

Pullers, Nail—
Cyclops.....50¢
Miller's Falls, No. 3, $\frac{1}{2}$ doz., \$12.00.....10¢
Morrill's No. 1, Nail Puller, $\frac{1}{2}$ doz.,
\$20.00.....50¢
Pearson No. 1, Cyclone Spike Puller,
each \$30.00.....50¢
Scranton, Case Lots:
No. 2B (large).....\$5.50
No. 3B (small).....\$5.00
Smith & Hemenway Co.:
Diamond B. case lots, $\frac{1}{2}$ doz. Large,
\$9.00; Small, \$7.50.
Glant No. 1, $\frac{1}{2}$ doz., \$18; No. 1 1/2,
\$16.50; No. 3, \$15.....35¢
Staple Pullers, Utica and Davi-
son.....60¢
Parrot Tack and Stub Puller, $\frac{1}{2}$ doz.,
75¢; $\frac{1}{2}$ gro., \$0.90

Pulleys, Single Wheel—
Inch.....1 1/2 1 3/4 2 3/4
Avening or Tackle,
doz. \$0.30 \$3 .60 1.05
Hay Fork, Swivel or Solid Eye,
doz., 4 in., \$1.25; 5 in., \$1.55

Inch.....2 1/4 2 3/4 3
Hot House, doz.....\$0.65 \$5 1.80
Inch.....1 1/4 1 1/2 1 3/4 2
Screw, doz.....\$0.16 1 1/2 2 3/4 3
Inch.....1 1/4 1 1/2 1 3/4 2
Side, doz.....\$0.25 1 1/2 2 3/4 3
Inch.....1 1/4 1 1/2 1 3/4 2

Stowell's:
Cedric End, Anti-Friction.....60¢10¢
Dumb Waiter, Anti-Friction.....60¢10¢
Electric Light.....60¢
Side, Anti-Friction.....60¢10¢

Sash Pulleys—
Common Frame; Square or
Round End, per doz, 1 1/4 and
2 in.....10¢10¢
Auger Mortise, no Face Plate,
per doz., 1 1/4 and 2 in., \$1.70
Acme.....1 1/4 in., 16 in.; 2 in., 18 in.
Fox-All-Steel, Nos. 3 and 7.....1 1/2 2 3/4 3 1/2 4 1/2 5 1/2 6 1/2 7 1/2 8 1/2 9 1/2 10 1/2 11 1/2 12 1/2 13 1/2 14 1/2 15 1/2 16 1/2 17 1/2 18 1/2 19 1/2 20 1/2 21 1/2 22 1/2 23 1/2 24 1/2 25 1/2 26 1/2 27 1/2 28 1/2 29 1/2 30 1/2 31 1/2 32 1/2 33 1/2 34 1/2 35 1/2 36 1/2 37 1/2 38 1/2 39 1/2 40 1/2 41 1/2 42 1/2 43 1/2 44 1/2 45 1/2 46 1/2 47 1/2 48 1/2 49 1/2 50 1/2 51 1/2 52 1/2 53 1/2 54 1/2 55 1/2 56 1/2 57 1/2 58 1/2 59 1/2 60 1/2 61 1/2 62 1/2 63 1/2 64 1/2 65 1/2 66 1/2 67 1/2 68 1/2 69 1/2 70 1/2 71 1/2 72 1/2 73 1/2 74 1/2 75 1/2 76 1/2 77 1/2 78 1/2 79 1/2 80 1/2 81 1/2 82 1/2 83 1/2 84 1/2 85 1/2 86 1/2 87 1/2 88 1/2 89 1/2 90 1/2 91 1/2 92 1/2 93 1/2 94 1/2 95 1/2 96 1/2 97 1/2 98 1/2 99 1/2 100 1/2 101 1/2 102 1/2 103 1/2 104 1/2 105 1/2 106 1/2 107 1/2 108 1/2 109 1/2 110 1/2 111 1/2 112 1/2 113 1/2 114 1/2 115 1/2 116 1/2 117 1/2 118 1/2 119 1/2 120 1/2 121 1/2 122 1/2 123 1/2 124 1/2 125 1/2 126 1/2 127 1/2 128 1/2 129 1/2 130 1/2 131 1/2 132 1/2 133 1/2 134 1/2 135 1/2 136 1/2 137 1/2 138 1/2 139 1/2 140 1/2 141 1/2 142 1/2 143 1/2 144 1/2 145 1/2 146 1/2 147 1/2 148 1/2 149 1/2 150 1/2 151 1/2 152 1/2 153 1/2 154 1/2 155 1/2 156 1/2 157 1/2 158 1/2 159 1/2 160 1/2 161 1/2 162 1/2 163 1/2 164 1/2 165 1/2 166 1/2 167 1/2 168 1/2 169 1/2 170 1/2 171 1/2 172 1/2 173 1/2 174 1/2 175 1/2 176 1/2 177 1/2 178 1/2 179 1/2 180 1/2 181 1/2 182 1/2 183 1/2 184 1/2 185 1/2 186 1/2 187 1/2 188 1/2 189 1/2 190 1/2 191 1/2 192 1/2 193 1/2 194 1/2 195 1/2 196 1/2 197 1/2 198 1/2 199 1/2 200 1/2 201 1/2 202 1/2 203 1/2 204 1/2 205 1/2 206 1/2 207 1/2 208 1/2 209 1/2 210 1/2 211 1/2 212 1/2 213 1/2 214 1/2 215 1/2 216 1/2 217 1/2 218 1/2 219 1/2 220 1/2 221 1/2 222 1/2 223 1/2 224 1/2 225 1/2 226 1/2 227 1/2 228 1/2 229 1/2 230 1/2 231 1/2 232 1/2 233 1/2 234 1/2 235 1/2 236 1/2 237 1/2 238 1/2 239 1/2 240 1/2 241 1/2 242 1/2 243 1/2 244 1/2 245 1/2 246 1/2 247 1/2 248 1/2 249 1/2 250 1/2 251 1/2 252 1/2 253 1/2 254 1/2 255 1/2 256 1/2 257 1/2 258 1/2 259 1/2 260 1/2 261 1/2 262 1/2 263 1/2 264 1/2 265 1/2 266 1/2 267 1/2 268 1/2 269 1/2 270 1/2 271 1/2 272 1/2 273 1/2 274 1/2 275 1/2 276 1/2 277 1/2 278 1/2 279 1/2 280 1/2 281 1/2 282 1/2 283 1/2 284 1/2 285 1/2 286 1/2 287 1/2 288 1/2 289 1/2 290 1/2 291 1/2 292 1/2 293 1/2 294 1/2 295 1/2 296 1/2 297 1/2 298 1/2 299 1/2 300 1/2 301 1/2 302 1/2 303 1/2 304 1/2 305 1/2 306 1/2 307 1/2 308 1/2 309 1/2 310 1/2 311 1/2 312 1/2 313 1/2 314 1/2 315 1/2 316 1/2 317 1/2 318 1/2 319 1/2 320 1/2 321 1/2 322 1/2 323 1/2 324 1/2 325 1/2 326 1/2 327 1/2 328 1/2 329 1/2 330 1/2 331 1/2 332 1/2 333 1/2 334 1/2 335 1/2 336 1/2 337 1/2 338 1/2 339 1/2 340 1/2 341 1/2 342 1/2 343 1/2 344 1/2 345 1/2 346 1/2 347 1/2 348 1/2 349 1/2 350 1/2 351 1/2 352 1/2 353 1/2 354 1/2 355 1/2 356 1/2 357 1/2 358 1/2 359 1/2 360 1/2 361 1/2 362 1/2 363 1/2 364 1/2 365 1/2 366 1/2 367 1/2 368 1/2 369 1/2 370 1/2 371 1/2 372 1/2 373 1/2 374 1/2 375 1/2 376 1/2 377 1/2 378 1/2 379 1/2 380 1/2 381 1/2 382 1/2 383 1/2 384 1/2 385 1/2 386 1/2 387 1/2 388 1/2 389 1/2 390 1/2 391 1/2 392 1/2 393 1/2 394 1/2 395 1/2 396 1/2 397 1/2 398 1/2 399 1/2 400 1/2 401 1/2 402 1/2 403 1/2 404 1/2 405 1/2 406 1/2 407 1/2 408 1/2 409 1/2 410 1/2 411 1/2 412 1/2 413 1/2 414 1/2 415 1/2 416 1/2 417 1/2 418 1/2 419 1/2 420 1/2 421 1/2 422 1/2 423 1/2 424 1/2 425 1/2 426 1/2 427 1/2 428 1/2 429 1/2 430 1/2 431 1/2 432 1/2 433 1/2 434 1/2 435 1/2 436 1/2 437 1/2 438 1/2 439 1/2 440 1/2 441 1/2 442 1/2 443 1/2 444 1/2 445 1/2 446 1/2 447 1/2 448 1/2 449 1/2 450 1/2 451 1/2 452 1/2 453 1/2 454 1/2 455 1/2 456 1/2 457 1/2 458 1/2 459 1/2 460 1/2 461 1/2 462 1/2 463 1/2 464 1/2 465 1/2 466 1/2 467 1/2 468 1/2 469 1/2 470 1/2 471 1/2 472 1/2 473 1/2 474 1/2 475 1/2 476 1/2 477 1/2 478 1/2 479 1/2 480 1/2 481 1/2 482 1/2 483 1/2 484 1/2 485 1/2 486 1/2 487 1/2 488 1/2 489 1/2 490 1/2 491 1/2 492 1/2 493 1/2 494 1/2 495 1/2 496 1/2 497 1/2 498 1/2 499 1/2 500 1/

Kauffel & Esser Co.:	35.10%
Folding, Wood.....	33.10%
Folding, Steel.....	33.10%
Lufkin's Steel.....	50.10%
Lufkin's Lumber.....	60%
Stanley R. & L. Co.:	
Boxwood.....	60%
Ivory.....	45%
Miscellaneous.....	60%
Zig Zag.....	40%
Zig Zag, Pin Joint.....	45%
Upon Nut Co.:	
Boxwood.....	60.10%
Ivory.....	35.10%

Sash Balances—

See Balance, Sash.

Sash Locks—

See Locks, Sash.

Sash Weights—

See Weights, Sash.

Sausage Stuffers or Fillers

See Stuffers or Fillers, Sausage.

Saw Frames—

See Frames, Saw.

Saw Sets—See Sets, Saw.**Saw Tools—See Tools, Saw.****Saws—**

Atkins:	
Circular.....	60%
Band.....	50.10%
Butcher Saws.....	50%
Cross Cuts.....	50%
One-Man Cross Cut.....	50%
Narrow Cross Cut.....	50%
Hand, Rip and Panel.....	35.5%
Miter Box and Compass.....	40%
Mulay, Mill and Drag.....	40%
Chapin-Stephens Co.:	
Turning Saws and Frames.....	30.30%
Diamond Saw & Stamping Works.....	30.10%
Sterling Kitchen Saws.....	30.10%
Diston's:	
Circular, Solid and Ins'ted Tooth.....	50%
Band, 2 to 14 in. wide.....	60%
Band, 1/4 to 1 1/2.....	60%
Crosscuts.....	50%
Narrow Crosscuts.....	50%
Mulay, Mill and Drag.....	50%
Framed Woodsaws.....	25%
Woodsaw Blades.....	25%
Woodsaw Rides.....	25%
Hand Saws, Nos. 12, 9, 9, 16, d100.....	25%
Dis, 120, 76, 77, 8.....	25%
Hand Saws, Nos. 7, 107, 107 1/2, 3.....	25%
8, 9, Combination.....	25%
Compass, Key Hole, &c.....	25%
Butcher Saws and Blades.....	30%
C. E. Jennings & Co.'s:	
Back Saws.....	25%
Butcher Saws.....	25%
Compass and Key Hole Saws.....	25%
Framed Wood Saws.....	25%
Hand Saws.....	20.2%
Wood Saw Blades.....	30%
Millers Falls:	
Butcher Saws.....	15.10%
Star Saw Blades.....	15.10%
Massachusetts Saw Works:	
Victor Kitchen Saws.....	40.10%
Butcher Saws.....	35.40%
Peace & Richardson's Hand Saws.....	30%
Simonds:	
Circular Saws.....	45%
Crescent Ground Cross Cut Saws.....	30%
One-Man Cross Cuts.....	40.10%
Gang Mill, Mulay and Drag Saws.....	45%
Band Saws.....	25%
Back Saws.....	25%
Butcher Saws.....	25%
Hand Saws.....	25%
Hand Saws, Bay State Brand.....	45%
Compass, Key Hole, &c.....	25%
Wood Saws.....	40.7%
Wheeler, Madchen & Clemens Mfg. Co.'s Cross Cut Saws.....	50%
Hack Saw Blades and Frames—	
Atkins' Hack Saw Blades A A A.....	25%
Diston's:	
Concave Blades.....	25%
Keystone Blades.....	25%
Hack Saw Frames.....	30%
Simonds File Co.....	35%
C. E. Jennings & Co.'s:	
Hack Saw Frames, Nos. 175, 180.....	40.7%
Hack Saws, Nos. 175, 180, complete.....	40.7%
Goodell's Hack Saw Frames.....	35.40%
Griffin's Hack Saw Blades.....	35.40%
Star Hack Saws and Blades.....	15.10%
Sterling Hack Saw Blades.....	30.10%
Sterling Hack Saw Frames.....	30.10%
Sterling Power Hack Saw Machines.....	25%
each, No. 1, \$25.00; No. 2, \$30.00.....	25%
Victor Hack Saw Blades.....	25%
Victor Hack Saw Frames.....	40%

Scroll—

Barnes, No. 1, \$15.....	25%
Barnes' Scroll Saw Blades.....	40%
Barnes' Velocipede Power Scroll Saw.....	118%
without boring attachment.....	20%
with boring attachment.....	20%
Lester, complete, \$10.00.....	15.10%
Rogers, complete, \$3.50 and \$4.00.....	15.10%

Scales—

Family, Turnbull's.....	50.10%
Counter:	
Hatch, Platform, 1/2 oz. to 4 lbs.....	35.50
Two Platforms, 1/2 oz. to 8 lbs.....	40.10%
Union Platform, Plain.....	1.70
Union Platform, Stpd.....	1.15
Chattillon's:	
Eureka.....	25%
Favorite.....	40%
Crocers' Trip Scales.....	60%
Chicago Scale Co.:	
The Little Detective.....	25 lbs 50%
Union or Family No. 2.....	50%
Portable Platform (reduced list).....	25.35%
Wagon or Stock (reduced list).....	25.35%
The Standard Portables.....	45%
The Standard R. R. and Wagon.....	50.10%
Scrapers—	
Rox, 1 Handle.....	22.00
Rox, 2 Handle.....	22.50
Ship.....	Light, \$2.00; Heavy, \$1.50

Adjustable Box Scraper (S. R. & L. Co.), \$4.00.....	45%
Chapin-Stephens Co., Box.....	30.20%

Screws—Bench and Hand

Bench, Iron, doz., 1 in., \$2.50.....	
2 1/2; 1 1/2, \$3.00; 3/4, 1/4, \$3.50.....	3.75
Bench, Wood.....	20.10%
Hand, Wood.....	20.10%
R. Bliss Mfg. Co., Hand.....	20%
Chapin-Stephens Co., Hand.....	20%
Coach, Lag and Hand Rail—	
Lag, Cone Point, list Oct. 1, '99.....	75.15%
Coach, Gimlet Point, list Oct. 1, '99.....	75.10%
Hand Rail, list Jan. 1, '91.....	70.10%

Jack Screws—

Standard List.....	75%
Millers Falls.....	50.10%
P. S. & W.....	50%
Swett Iron Works.....	75.80%

Machine—

List Jan. 1, '98:	
Flat or Round Head, Iron.....	50.50%
Flat or Round Head, Brass.....	50.50%
Set and Cap.....	75.10%

Set (Steel), net advance over Iron

Sq. Hd. Cap.....	70.10%
Hex. Hd. Cap.....	70.10%
Rd. Hd. Cap.....	50.7%
Fillister Hd. Cap.....	60.7%

Wood—

List July 23, 1903:	
Flat Head, Iron.....	87.10%
Round Head, Iron.....	85.10%
Flat Head, Brass.....	82.10%
Round Head, Brass.....	80.10%
Flat Head, Bronze.....	77.10%
Round Head, Bronze.....	75.10%
Drice Screws.....	87.10%

Scroll Saws—

See Saws, Scroll.	
Scythes—	
Grass, No. 1, Plain.....	\$6.25
Clipper, Bronzed Webb.....	\$6.50
No. 3 Clipper, Pol'd Webb.....	\$6.75
No. 6 Clipper and Solid Steel.....	\$7.00
Bush, Weed and Bramble, No. 2.....	\$6.50
Grain, No. 1.....	\$8.25
Bronzed Webb, No. 1.....	\$8.50
Nos. 3 and 4 Clipper, Grain.....	\$8.75
Solid Steel, No. 6.....	\$9.25

Seeders, Ralsin—

Enterprise.....	25.30%
Sets—Aul and Tool—	
Fray's Adj. Tool Handles Nos. 1, \$12; 2, \$18; 3, \$12; 4, \$9; 5, \$7.....	50%
C. E. Jennings & Co.'s Model Tool Holders.....	30%
Millers Falls Adj. Tool Handles, No. 1, \$12; No. 4, \$12; No. 5, \$18.....	15.10%

Garden Tool Sets—

Ft. Madison Three Plows, Hoe, Rake and Shovel.....	9 doz sets \$9.00
Sets, Nail—	
Octagon.....	gro. \$3.50
Buck Bros.....	27%
Cannon's Diamond Point.....	gro. \$12.40
Mayhew's.....	gro. \$9.50
Snell's Corrugated Cup Pt.....	gro. \$7.20
Snell's Knurled Cup Pt.....	gro. \$7.20
Victor Knurled Cup Pt.....	gro. \$7.50

Rivet—**Saw—**

Atkins:	
Criterion.....	40%
Adjustable.....	40%
Diston's Star, Monarch and Triumph.....	30%
Morrill's No. 1.....	\$15.00
Nos. 3 and 4, Cross Cut.....	\$20.00
No. 5, Mill.....	\$30.00
Nos. 10, 11, 95.....	\$15.00
No. 1 Old Style.....	\$10.00
Special.....	\$16.25
Giant Royal Cross Cut.....	doz. \$8.00
Royal, Hand.....	doz. \$4.50
Taintor Positive.....	doz. \$6.75

Shaving

Fox Shaving Sets, No. 30.....	doz. net, \$24.00
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Smith & Hemenway Co.'s.....**Sharpeners, Knife—**

Chicago Wheel & Mfg. Co.....	70%
Pike Mfg. Co.:	
Fast Cut Pocket Knife Hones.....	\$1.50
Mounted Kitchen Sand Stone.....	\$1.50
Natural Grit Carving Knife.....	\$3.00
Hones, # doz.....	\$3.00
Quick Cut Emery Carving Knife Hones, # doz.....	\$1.50
Quick Edge Pocket Knife Hones, # doz.....	\$2.50

Skate—**Shaves, Spoke—**

Iron.....	doz. \$1.10
Wood.....	doz. \$1.10
Railley's (Stanley R. & L. Co.).....	45%
Razor Edge (Stanley R. & L. Co.).....	45%
Chapin-Stephens Co.....	30.20%
Goodell's # doz.....	\$9.00
Wood's F1 and F2.....	15.10%

Shears—

Cast Iron.....	7 8 9 in.
Best.....	\$16.00 28.00 20.00 gro.
Good.....	\$13.00 15.00 17.00 gro.
Cheap.....	\$5.00 6.00 7.00 gro.
Straight Trimmers, &c.—	
Best quality Jap.....	70.10%
Best quality, Nickel.....	60.10%
Fair quality, Jap.....	80.10%
Fair quality, Nickel.....	75.10%

Tailors' Shears.....	40.10%
Acme Cast Shears.....	40.10%
Heinrich's Tailors' Shears.....	40.10%
Wilkinson Shear & Cutlery Co.:	
Sheep, 1900 list.....	30.10%
Grass.....	50.10%
Horse or Mule.....	50.10%

Tinners' Snips—

Steel Laid Blades.....	40.10%
Forged Handles, Steel Blades, Berlin.....	40.10%
Heinrich's Snips.....	40%
Jennings & Griffin Mfg. Co.'s #4 to 10 in.....	50%
Niagara Snips.....	40%
P. S. & W. Forged Handles.....	20%

Pruning Shears—

Cronk's Hand Shears.....	33.1%
Cronk's Wood Handle Shears.....	33.1%
Diston's Combined Pruning Hook and Saw.....	\$18.00
Diston's Pruning Hook only, # doz.....	\$12.00
John T. Henry Mfg. Co.:	
Pruning Shears, all grades.....	50%
P. S. & W. Co.....	30%
Wilkinson Shear & Cutlery Co.:	
Hedge, Wilcut Brand.....	60.10%
Lawn and Border, Wilcut Brand.....	60.10%

Sheaves—Sliding Door—

Stowell's Anti-Friction.....	50%
Reading.....	40%
R. & E. list.....	15%
Wright's Hatfield Pattern.....	80%

Sliding Shutter—

Reading list.....	40%
R. & E. list.....	10%

Shells—Shells, Empty—

Brass Shells, Empty:	
Climax, 10 and 12 gauge.....	65.10%
Club, Rival, 65.5%; First Quality.....	60.5%

Paper Shells, Empty:

New Rapid, 10, 12, 16 and 20 gauge.....	25.10%
Climax, 10 and 12 gauge; Acme, 10, 12, 16 and 20 gauge; Ideal, 10, 12, 16 and 20 gauge; Leader grade.....	25.5%
Union, League, 12 and 12 gauge.....	25%
Rival Grade.....	25%
New Climax, Defiance, 10, 12, 14, 16 and 20 gauge; Climax, 14, 16 and 20 gauge.....	30.5%
Challenge, Monarch, 10, 12, 16 and 20 gauge; League, Union, 14, 16 and 20 gauge; Repeater Grade.....	23%
Expert, 10, 12, 16 and 20 gauge.....	33.5%

Robin Hood, Low Brass.....**Robin Hood, High Brass.....****Indian, for Black Powder.....****Shells, Loaded—****Loaded with Black Powder.....****Loaded with Smokeless Powder.....****Loaded with Smokeless Powder.....****Robin Hood:****Smokeless Robin Hood, Low Brass.....****Smokeless Comets, High Brass.....****Indian, Black Powder.....****Wheeler:****Smokeless Repeater Grade.....****Smokeless Leader Grade.....****Black Powder.....****Shingles, Metal—Per Sq.****Edwards Mfg. Co.:****14 x 20.....****10 x 14.....****7 x 10.....****Wheeling Corrugating Co.:****Dixie, 14 x 20 in.....****Dixie, 10 x 14 in.....****Dixie, 7 x 10 in.....****Shoes, Horse, Mule, &c.—****P.O.B. Pittsburgh:****Iron.....****Steel.....****Burden's, all sizes.....****Shot—****Drop, 10 to B.....****Drop, B and larger.....****Buck.....****Chilled.....****Dust.....****Shovels and Spades—****Association List, Nov. 15, 1902.....****Snow Shovels—****Long Handle.....****Wood and Mall, D. Handle.....****Sieves and Sifters—****Hunter's Imitation.....****Hunter's Genuine.....****Buffalo Metallic Blue, R. M. Co., # gr.....****14.16.....****13.20.....****Sieves, Seamless Metallic****Mesh.....****Iron Wire.....****Tinned Wire.....****Sieves, Wooden Rim—****Nested, 10, 11 and 12 inch.....****Mesh 10, Nested.....****Mesh 20, Nested.....****Mesh 21, Nested.....****Sinks, Cast Iron—****Painted, Standard list:****12 x 12 to 22 x 36 in.....****20 x 40 to 24 x 50 in.....****24 x 60 to 24 x 120 in.....****Barnes' low list:****Up to and including 20 x 36 in.....****20 x 40 to 24 x 50 in.....****NOTE—There is not entire uniformity in lists used by jobbers.****Skins, Wagon—****Cast Iron.....****Steel.....****Slates, School—****Factory Shipments.****"D" Slates.....****Eureka, Unexcelled Noiseless.....****Victor A, Noiseless.....****Slaw Cutters—See Cutters.**

Scythe Stones—

Chicago Wheel & Mfg. Co.
Gem, 10 in., \$2.00; 12 in., \$3.00.

Norton Alundum Scythe Stones:

Less than 10 gross lots... \$2.00
Lots of 10 gross or more... \$1.50

Black Diamond S. S. 8 in. gro. \$12.00

Lamoille S. S. 8 in. gro. \$11.00

White Mountain S. S. 8 in. gro. \$9.00

Green Mountain S. S. 8 in. gro. \$8.00

Extra Indian Pond S. S. 8 in. gro. \$7.50

No. 1 Indian Pond S. S. 8 in. gro. \$7.00

Leader Red End S. S. 8 in. gro. \$6.50

Quick Cut Emery... 8 in. gro. \$10.00

Pure Corundum... 8 in. gro. \$18.00

Crescent... 8 in. gro. \$7.00

Emery Scythe Rifles, 2 Coat, \$8

Emery Scythe Rifles, 3 Coat, \$10

Emery Scythe Rifles, 4 Coat, \$12

Balance of 1904 list 3 1/2%

Stoppers, Bottle—

Victor Bottle Stoppers... \$2.00

Stops—Bench—

Millers Falls... 15 & 10%

Morrill's, No. 2, No. 1, \$10.00... 50%

Morrill's, No. 2, \$12.50... 50%

Door—

Chapin-Stephens Co... \$6.00 @ 10%

Plane—

Chapin-Stephens Co... 20%

Straps—Box—

Cary's Universal, case lots... 20 & 10 & 10%

Stretchers, Carpet—

Cast Iron, Steel, Felt, dos. 60 @ 60 & 10%

Socket

Bullard, 1/2 doz. \$1.00

Excelsior Stretcher and Tack Hammer Combined, 1/2 doz. \$6.00... 20%

Strops, Razor—

Star Diagonal Strop... 25%

Stuffers, Sausage—

Enterprise Mfg. Co... 25 & 25 & 7 1/2%

National Specialty Co., list Jan. 1, 1902... 30 & 5%

Sweepers, Carpet—

National Sweeper Co... 1/2 doz.

Louis XV, Roller Bearing, Gold Plated... \$12.00

Hepplewhite, Roller Bearing, Silver Plated... \$12.00

Sheraton, Roller Bearing, N'kel \$40.00

Ye Mission, Roller Bearing, Oxidized Copper... \$35.00

Transparent, Roller Bearing, Plate Glass top, Nickel... \$36.00

National Queen, Roller Bearing, Fancy Venetians... \$47.00

Loyal, Roller Bearing, Veneers, Nickel... \$25.00

Triple Medal, Roller Bearing, Nickel... \$24.00

Marion, Roller Bearing, N'kel \$24.00

Marion Queen, Roller Bearing, Nickel... \$21.00

Monarch, Roller Bearing, N'kel \$22.00

Monarch, Roller Bearing, Jap. \$20.00

Perpetual, Regular B'rs, N'kel \$20.00

Perpetual, Regular B'rs, Jap. \$18.00

Monarch Extra (17 in. case), Roller Bearing, Nickel... \$36.00

Monarch Extra (17 in. case), Roller Bearing, Japanned... \$33.00

Auditorium (25 in. case), Roller Bearing, Nickel... \$34.00

Mammoth (30 in. case), Roller Bearing, Nickel... \$40.00

NOTE—Rebates: 50c per dozen on three-dozen lots; \$1 per dozen on five-dozen lots; \$2 per dozen on ten-dozen lots; \$2.50 per dozen on twenty-five-dozen lots.

Streator Metal Stamping Co.

Eureka Japanned... 1/2 doz. \$15.00

Model E, Sanitaire... 1/2 doz. \$20.00

Model A, Sterilizing... 1/2 doz. \$25.00

Model B, Sterilizing, Nickel... 1/2 doz. \$24.00

Model B, Sterilizing, Japanned... 1/2 doz. \$21.00

Model C, Sterilizing... 1/2 doz. \$21.00

Model D, Sterilizing... 1/2 doz. \$19.50

Tacks, Finishing Nails, &c.

New List, May 1, 1905.

American Carpet Tacks... 90 & 35%

American Cut Tacks... 90 & 35%

Swedes Cut Tacks... 90 & 35%

Swedes Upholsterers... 90 & 35%

Gimp Tacks... 90 & 45%

Lace Tacks... 90 & 45%

Trimmers' Tacks... 90 & 35%

Looking Glass Tacks... 65%

Bill Posters' and Railroad Tacks... 90 & 45%

Hungarian Nails... 80 & 20%

Finishing Nails... 70%

Trunk and Clout Nails... 80%

NOTE—The above prices are for Standard Weights. An extra 5% is given on Medium Weights, and an extra 10% is given on light weights.

Miscellaneous—

Double Pointed Tacks... 90 & 4 or 5 tens

See also Nails, Wire.

Tanks, Oil—

Emerald, R. M. Co... 30-gal. \$3.40

Emerald, R. M. Co... 60-gal. \$4.25

Queen City, R. M. Co... 30-gal. \$3.65

Queen City, R. M. Co... 60-gal. \$4.50

Tapes, Measuring—

American Asses' Skin... 50¢—7

Patent Leather... 25¢ @ 30 & 5%

Steel... 33 1/2 & 5%

Chesterman's... 25¢ @ 25 & 5%

Keuffel & Esser Co... 60 & 10 & 50%

Favorite, Ass Skin... 60 & 10 & 50%

Favorite, Duck and Leather... 25 & 50 & 10%

Metallic and Steel lower list, 35 & 45%; Pocket, 35 & 45%

Larkin's Asses' Skin... 10 & 10 & 50%

Metallic

Patent Bend, Leather... 25 & 50 & 10%

Pocket... 40 & 40 & 5%

Steel... 33 & 35%

Wiegand & Hilger:

Chesterman's Metallic, No. 34L, etc.

Chesterman's Steel, No. 108L, etc.

Teeth, Harrow—

Steel Harrow Teeth, plain or headed, 1/2-inch and larger... per 100 lbs. \$2.75 @ \$3.00

Thermometers—

Tin Case... 80 & 10 @ 10 & 10 & 5%

Ties, Bale—Steel Wire—

Single Loop... 80 & 10 1/2%

Monitor, Cross Head, 40... 70%

Brick Ties—

Niagara Brick Ties... 25 & 10%

Tinners' Shears, &c.—

See Shears, Tinners' &c.

Tinware—

Stamped, Japanned and Piced, sold very generally at net prices.

Fire Benders, Upsetters, &c.

See Benders and Upsetters, Tire.

Tools—Coopers'—

L. & I. J. White... 20 @ 20 & 5%

Hay—

Myers' Hay Tools... 50%

Stowell's Hay Carriers, 50%; Hay Forks, 50%; Fork Pulleys, 50%.

Miniature—

Smith & Hemenway Co's, David-son

Saw

Atkins' Cross Cut Saw Tools... 35%

Simonds' Improved... 35%

Simonds' Crescent... 25%

Ship—

L. & I. J. White... 25%

Transom Lifters—

See Lifters, Transom.

Traps—Fly—

Balloon, Globe or Acme, doz. \$1.15 @ \$1.25; gro. \$11.50 @ \$12.00

Harper, Champion or Paragon, doz. \$1.25 @ \$1.40; gro. \$13.00 @ \$13.50

Game—

Imitation Oneida... 75 & 15 & 5%

Newhouse... 45 & 15 & 5%

Hawley & Norton... 65%

Victor... 70 & 10%

Oneida Community Jump... 50%

Mouse and Rat—

Mouse, Wood, Choker, doz. holes 8 1/2 @ 9 1/2

Mouse, Round or Square Wire, doz. 85 @ 90 1/2

Marty French Rat and Mouse Traps (Genuine):

No. 1, Rat, 1/2 doz. \$13.25; case of 24... \$11.50 doz.

No. 3, Rat, 1/2 doz. \$6.50; case of 50... \$5.75 doz.

No. 3 1/2, Rat, 1/2 doz. \$5.25; case of 72... \$4.70 doz.

No. 4, Mouse, 1/2 doz. \$3.85; case of 150... \$3.00 doz.

No. 5, Mouse, 1/2 doz. \$3.00; case of 150... \$2.50 doz.

Wood's E. I... 50%

Trowels—

Diamond Brick and Pointing... 25%

Diamond Plastering... 20%

Diamond "Standard Brand" and Garden Trowels... 30%

Kohler's Steel Garden Trowels, 1/2 doz. 5 in. \$4.50; 6 in. \$6.00.

Never-Break Steel Garden Trowels... 1/2 doz. \$6.00

Rose Brick and Plastering... 25 & 3%

Woodrough & McFarlin, Plastering... 25%

Trucks, Warehouse, &c.—

B. & L. Block Co.: New York Pattern... 50 & 10%

Western Pattern... 60 & 10%

Handy Trucks... 1/2 doz. \$16.00

Grocery... 1/2 doz. \$15.00

Daily Store Trucks, Improved Pattern... 1/2 doz. \$18.50

McKinney Trucks... each \$10.00

Model Store Trucks... 1/2 doz. \$18.50

Tubs, Wash—

M'Parr's list, price per gross.

No. 0 1 2 3

Galvanized, \$64 \$76 \$81 \$96 10 & 5%

Galvanized Wash Tubs (R. M. Co.):

No. 1 2 3 10 20 30

Per doz., net. \$5.70 6.30 7.20 6.80 7.20 8.10

Twine, Miscellaneous—

Flax Twine:

No. 9, 1/4 and 1/2-lb. Balls. 22 @ 24 1/2

No. 12, 1/4 and 1/2-lb. Balls. 20 @ 21 1/2

No. 18, 1/4 and 1/2-lb. Balls. 17 @ 19 1/2

No. 24, 1/4 and 1/2-lb. Balls. 16 @ 18 1/2

No. 36, 1/4 and 1/2-lb. Balls. 15 @ 17 1/2

Chalk Line, Cotton 1/4-lb. Balls... 25 @ 30 1/2

Cotton Mops, 6, 9, 12 and 15 lb. to doz... 10 @ 18 1/2

Cotton Wrapping, 5 Balls to lb. according to quality... 1 1/2 @ 22 1/2

American 2-Ply Hemp, 1/4 and 1/2-lb. Balls... 13 1/2 @ 14 1/2

American 3-Ply Hemp 1-lb. Balls... 1 1/2 @ 15 1/2

India 2-Ply Hemp, 1/4 and 1/2-lb. Balls (Spring Twine)... 9 1/2 @ 10 1/2

India 3-Ply Hemp, 1-lb. Balls... 9 1/2 @ 10 1/2

India 3-Ply Hemp, 1 1/2-lb. Balls... 9 @ 10 1/2

2, 3, 4 and 5-Ply Jute, 1/4-lb. Balls... 11 @ 13 1/2

Mason Line, Linen, 1/4-lb. Bls. 14 1/2

No. 284 Mattress, 1/4 and 1/2-lb. Balls, according to quality... 30 @ 60 1/2

Wool, 3 to 6 ply... B 7 1/2 @ A 9 1/2

Vises—

Solid Box... 60%

Parallel—

Athol Machine Co.: Simpson's Adjustable... 40%

Standard... 40%

Amateur... 40%

Columbian Hdw. Co... 40%

Emmert Universal: Pattern Makers' No. 1, \$15.00; No. 2, \$12.50.

Machinist and Tool Makers' No. 1A, \$12.50; No. 6A, \$10.00; No. 10A, \$22.50.

Presto Quick Acting Adjustable Jaw, 25 @ 25 & 10%; Solid Jaw... 35 @ 35 & 10%

Tiger Machinists'... 40%

Fisher & Norris Double Screw, net, each, Nos. 2, 10.50; 3, 11.00; 4, 12.50; 5, 12.00.

Hollands: Machinists'... 100 & 40 & 5%

Keystone... 65 & 40 & 7 1/2%

Lewis Tool Co.: Adjustable Jaw... 30%

Monarch, 60%; Solid Jaw... 50%

Massey Vice Co.: Clincher... 40%

Perfect, 15%; Lightning Grip... 15%

Merrill's... 20%

Millers Falls Oval Slide Pattern... 60 & 10%

Parker's: Victor, 20 @ 25%; Regulars... 20 @ 25%

Vulcan's... 40 @ 45%

Combination Pipe... 55 @ 60%

Prentiss... 20 @ 25%

Snedker's X. L... 33 1/2%

Stephens'... 33 1/2%

Saw Filers—

Diston's D 3 Clamp and Guide, 1/2 doz. \$24.00, 30%; Clamps... 30%

Perfection Saw Clamps, 1/2 doz. \$4.50

Reading... 60%

Wentworth's Rubber Jaw, Nos. 1, 2 and 3... 50%

Wood Workers—

Massey Vice Co.: Lightning Grip, 15%; Perfect... 15%

Wyman & Gordon's Quick Action, 6 in. \$6.00

CURRENT METAL PRICES.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:	
1 to 1 1/2 in. round and square.....	per lb. 2.90¢
1 1/2 to 4 in. x 1/2 to 1 in.	per lb. 2.40¢
1 1/2 to 4 in. x 1/2 to 5-16.....	per lb. 2.40¢
Rods—1/2 and 11-16 round and square.....	per lb. 2.40¢
Angles:	
3 in. x 3/4 in. and larger.....	per lb. 2.40¢
(except 3/4 in. and 4 x 3/4 2.90¢)	
3 in. x 3-16 in. and 1/2 in.	per lb. 2.65¢
1 1/2 to 2 1/2 in. x 1/2 in.	per lb. 2.45¢
1 1/2 to 2 1/2 in. x 3-16 in. and thicker.....	per lb. 2.40¢
1 to 1 1/4 in. x 3-16 in.	per lb. 2.45¢
1 to 1 1/4 x 1/2 in.	per lb. 2.50¢
3/4 x 1/2 in.	per lb. 2.65¢
3/4 x 1/2 in.	per lb. 2.75¢
3/4 x 1/2 in.	per lb. 2.80¢
3/4 x 3-16 in.	per lb. 4.30¢
Tees:	
1 in.	per lb. 2.75¢
1 1/2 in.	per lb. 2.55¢
1 1/2 to 2 1/2 in.	per lb. 2.45¢
3 in. and larger.....	per lb. 2.50¢
Beams.....	per lb. 2.40¢
Channels, 3 in. and larger.....	per lb. 2.40¢
Hands—1 1/2 to 3 x 3-16 to No. 8.....	per lb. 3.45¢
"Burden's Best" Iron, base price.....	per lb. 3.05¢
Bureau's "H. B. & S." Iron, base price.....	per lb. 3.00¢
"Uls er".....	per lb. 3.10¢
Norway Bars.....	per lb. 3.40¢
Norway Shapes.....	per lb. 3.90¢

Merchant Steel from Store—

Pessemmer Machinery.....	per lb. 3.10¢
Too Calk, Tire and Sleigh Shoe.....	per lb. 2.50¢@3.00¢
Best Cast Steel, base price in small lots.....	per lb. 7¢

Sheets from Store—

Black

	One Pass, C.H.	R. G.
	Soft Steel.	Cleaned.
No. 14.....	per lb. 2.90¢	3.00¢
Nos. 16 to 21.....	per lb. 3.05¢	3.10¢
No. 27.....	per lb. 3.20¢	3.25¢
No. 28.....	per lb. 3.30¢	3.60¢

Russia, Planished, &c.

Genuine Russia, according to assortment.....	per lb. 11 1/4¢@14¢
Patent planished.....	per lb. A, 10¢; B, 9¢, net.

Galvanized.

Nos. 14 to 16.....	per lb. 3.25¢
Nos. 22 to 24.....	per lb. 3.65¢
No. 27.....	per lb. 4.10¢
No. 28.....	per lb. 4.30¢

No. 20 and lighter 36 inches wide, 25¢ higher.

Tin Plates—

American Charcoal Plates (per box.)

A. A. A. Charcoal:	
IC, 14 x 20.....	per box. \$6.60
IX, 14 x 20.....	per box. 7.35
A. Charcoal:	
IC, 14 x 20.....	per box. \$5.65
IX, 14 x 20.....	per box. 6.75

American Coke Plates—Bessemer—

IC, 14 x 20.....	per box. \$4.65
IX, 14 x 20.....	per box. 5.65

American Terne Plates—

IC, 20 x 28 with an 8 lb. coating.....	per box. \$9.00
IX, 20 x 28 with an 8 lb. coating.....	per box. 11.00

Seamless Brass Tubes—

List December 4, 1905.....	Base price 26¢.
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Brass Tubes, Iron Pipe Sizes—

List December 4, 1905.....	Base price 26¢.
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Copper Tubes—

List December 4, 1905.....	Base price 30¢.
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Brazed Brass and Bronze Tubes—

List June 6, 1898.....	Discount 15%.
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High Brass Rods—

List June 6, 1898.....	Discount 7 1/2%.
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Roll and Sheet Brass—

List June 6, 1898.....	Discount 3%.
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METALS—

Tin—

Straits Pig.....	per lb. 44¢@45¢
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Copper—

Lake Ingot.....	per lb. 24 1/4¢@25¢
Electrolytic.....	per lb. 24¢@24 1/4¢
Casting.....	per lb. 23¢@24¢

Sheet Copper Hot Rolled, 16 oz.....	per lb. 27¢
14.....	per lb. 25¢
Sheet Copper Cold Rolled, 1¢ per lb. advance over Hot Rolled.....	
Sheet Copper Polished 20 in. wide and under, 1¢ advance over Cold Rolled.....	
Sheet Copper Polished over 20 in. wide, 2¢ advance over Cold Rolled.....	
Bottoms, Pits and Flats.....	per lb. 3¢ basis
Planished Copper, 1¢ per lb. more than Polished.....	

Spelter—

Western.....	per lb. 7 1/4¢@7 1/2¢
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Zinc.

No. 9, base, casks, per lb. 8.50¢ Open.....	per lb. 9.00¢
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Lead.

American Pig.....	per lb. 6 1/4¢@7 1/4¢
Bar.....	per lb. 7 1/4¢@7 1/2¢

Solder.

1/2 & 1/2, guaranteed.....	per lb. 20 1/2¢@27¢
No. 1.....	per lb. 24¢@24 1/2¢
Refined.....	per lb. 20 1/4¢@21 1/2¢
Prices of Solder indicated by private brand vary according to composition.	

Antimony—

Cookson.....	per lb. 27¢@28¢
Halletts.....	per lb. 26¢@27¢
Other Brands.....	per lb. 24¢@25¢

Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingot for remelting:	
Small lots.....	nominal.
100-lb. lots.....	nominal.

Old Metals.

Dealers' Purchasing Prices Paid in New York

	Cents
Copper, Heavy Cut and Crucible.....	per lb. 19.50¢@20.50¢
Copper, Heavy and Wire.....	per lb. 19.00¢@19.50¢
Copper, Light and Bottoms.....	per lb. 17.75¢@18.50¢
Brass, Heavy.....	per lb. 15.75¢@14.50¢
Brass, Light.....	per lb. 11.75¢@12.50¢
Heavy Machine Composition.....	per lb. 18.50¢@19.50¢
Clean Brass Turnings.....	per lb. 13.50¢@14.00¢
Composition Turnings.....	per lb. 15.50¢@16.25¢
Lead, Heavy.....	per lb. 5.40¢@5.60¢
Lead, Light.....	per lb. 5.00¢@5.40¢
Zinc Scrap.....	per lb. 4.75¢
No. 1 Yard Wrought, Long.....	per lb. \$17.00@17.50
No. 1 Yard Wrought, Short.....	per lb. \$16.00@16.75
Wrought Pipe.....	per lb. \$12.5¢@13.00
No. 1 Machinery Cast.....	per lb. \$6.00@17.00
Store Plate.....	per lb. \$12.50@13.25

THE IRON AGE

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